With the talk of recession so widespread and the viewer-with-alarmers having a field day, sudden shocks scare us. Not so with a shock or two we have had since issuing our January BLUE BOOK. It all has to do with the announcements we have regarding replacements and improvements by telephone companies. They are the real antidote for "recession."

With several companies now preparing to start work delayed for several years we were quite proud to receive commendation for the article "Replacement of Wornout Materials" that appeared in our columns last month. We thought it was good too, and tied it in with the Buyer's Guide Section to further assist you in being ready to begin with the first weather break.

▼

Next month we will present a well illustrated feature that will be of much interest to all telephone companies, large or small. It has to do with the unusual in construction problems. Coming in March it will be of invaluable assistance both in outside work and that within the exchange.

▼

How do you like our new "Long Lines" feature?

TELEPHONE ENGINEER
MANAGEMENT · ENGINEERING · MAINTENANCE

Vol. 42 No. 2 February, 1938

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SERVING THE FIVE BILLION DOLLAR TELEPHONE INDUSTRY

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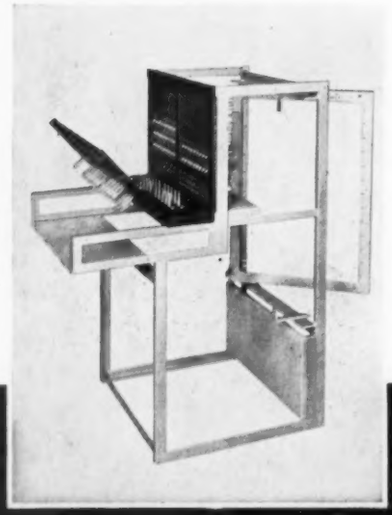
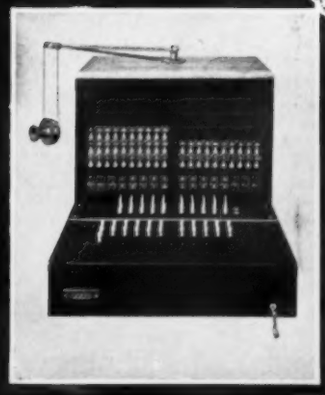
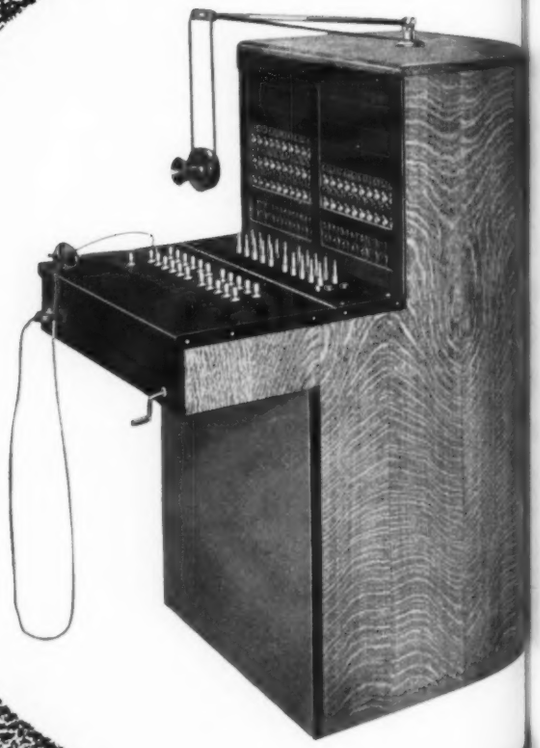
the Masterbuilt idea now comes to you

Magneto







Editorial « « «

Whither Goeth We?

IN this day and age when there is a tendency for Federal government agencies to override jurisdiction of state government bodies, it is certainly refreshing to see state utility commissions take definite and positive steps to safeguard their authority and to protect those under their jurisdiction.

This is the action recently taken by four state commissions in issuing orders to the effect that rural electric cooperatives, financed by the Federal Rural Electrification Administration, must pay telephone companies for necessary materials to metallize their grounded lines to eliminate inductive interference caused by the paralleling of these lines by electric lines, and pay the cost of relocating telephone lines in case of crossovers. Telephone companies must install the materials at their own expense.

Last June REA Administrator, John M. Carmody, ruled REA would not reimburse telephone companies for expense of metallizing existing ground telephone lines to eliminate inductive interference, notwithstanding the fact his predecessor, Morris L. Cooke, assured telephone companies REA would pay its just share of such expense.

For some time REA has questioned authority of state commissions to make rules governing allocation of costs involved in eliminating inductive interference from telephone lines.

The Minnesota Railroad Commission is the most recent commission to issue such an order referred to above. Other states in which commissions have made similar order are Iowa, North Dakota and Oklahoma.

While the Nebraska State Railway Commission did not issue an order definitely allocating the cost of metallizing grounded telephone lines, the commission in its order of October 14, refused to permit an REA project to parallel a grounded telephone line, having refused to pay the cost, or any part thereof, of metallizing the telephone line. The commission stated the law gives it power to grant or deny application for wire line construction. The law also prohibits "building of these lines in proximity to existing lines unless sufficient clearance is provided, where such construction will impair the efficiency and operation of existing properly constructed wire companies."

While REA Administrator, Carmody, has called grounded telephone lines "old-fashioned," the Nebraska Commission pointed out its order that "through grounded lines farmers are able to receive telephone service at the minimum cost" and stated that these grounded lines "are now serving the purpose for which they were intended." The commission ruled that a grounded telephone line is a properly constructed telephone line and that the proposed electric line would interfere with the operation and efficiency of the grounded telephone line in question. The commission also took into consideration the fact of prior occupancy of the highway by the telephone company's line. ...

The Nebraska Commission ordered the REA cooperative to bear any reasonable expense that may be necessary on its own lines or on existing communication lines to remove interference. The commission ruled the REA lines could not parallell the grounded telephone line "except and until the REA and the telephone company entered into an agreement on the amount of such reasonable expense." n

The Kansas Corporation Commission, on October 2, issued an order exercising its jurisdiction over construction of rural electric lines and one which would prevent interference on grounded telephone lines. However, on October 25, the Commission issued a second order which some engineers claim destroyed the effectiveness of the initial order.

The Kansas Commission pointed out in the first order that the law gives it power to prescribe reasonable rules and regulations with respect to "stringing and maintaining wires on highway where there is danger or possibility of unreasonable interference to wires or service of one utility by those of another utility."

The original order denied an application of an REA Association to construct an electric line until the REA plans and specifications were revised to provide that no conductor of the electric line shall be grounded where paralleling telephone lines.

The REA Association did revise its specifications, however, they were not revised as directed by the commission's order. They were amended to provide that "no ground shall be attached or connected to the primary neutral conductor at any point wherein said neutral conductor parallels an existing telephone system on the same highway, or within 200 feet on either side of said parallel." The revised specifications were presented to the Kansas Commission and on October 25, they were approved as revised.

(Please turn to page 43)

"Tapping In" On Washington

By ROLAND C. DAVIES
Editor
Telecommunications Reports

DURING March the telephone industry may learn the results of the $1,500,000 two-year telephone investigation of the Federal Communications Commission, when its report on the findings and legislative recommendations, founded on that inquiry, are transmitted to Congress.

The sending of the Investigation Report to Congress is highly important to the telephone industry, because it may disclose significant future trends of the government's regulatory activities—not only by the Federal agency, the FCC, but by many state commissions which guide their course along the doctrines, generated from Washington. However, the FCC's recommendations for increased regulatory power over the industry probably will not be considered by Congress at the present session, it is speculated, because Congress is anxious to wind up its affairs next spring due to the approaching 1938 elections in which the 435 Representatives and 32 Senators will be battling for reelection. On the basis of that outlook it is considered doubtful that the FCC report will be taken up by either the Senate or the House for legislative action, although the Interstate Commerce, Committee of the two branches of Congress might launch hearings before adjournment on some of the FCC proposals.

● The nature and contents of the Investigation report are being closely guarded before its transmittal to Congress, so what recommendations are in the offing cannot be determined or even accurately speculated about. The report in its preliminary draft form even had not reached the membership of the Commission before mid-February from the corps of Investigation experts who had been formulating it in day and night sessions and it is shown that the Commissioners were planning to scrutinize it with the greatest of care to whip it into the final form for its dispatch to Capitol Hill.

The FCC Commissioners during their study of the draft of the report were expected to be divided into two schools of thought. One group felt that a drastic attack on major phases of the telephone industry with some revolutionary regulatory proposals, such as the separation of Western Electric from the Bell System, should go to Congress. The other school of thought took the attitude that the Investigation was ex-parte in character and that on the basis of one-sided evidence the report should not contain any sensational assault or startling legislative proposals, because the nation's telephone system was conceded to be the best in the world, and therefore the FCC should not make any recommendations to upset the quality and stability of that telephone service which were founded on ex-parte evidence and studies.

Telegraph Rate Increase Before FCC . . .

● The Commission was occupied during the latter part of February with one of the most difficult problems since its creation in 1934—the appeals of the five leading wire and radio telegraph companies for a 15 per cent increase in domestic rates to make up the drastic drop in revenues during the present recession of business. Western Union, Postal Telegraph, RCA Communications and the two Mackay Radio and Telegraph companies presented the picture of their revenue needs in the face of dwindling traffic in mid-February.

It was the first time that the FCC has been faced with the issue of a rate increase by the communications companies under its regulation. The hearing also was the first Federal-State cooperative proceeding as five state commissioners joined the FCC in receiving the petitions and testimony of the telegraph companies for the boosting of their message rates. Another feature of the hearing was the participation by the CIO communications union, American Telegraphists Association, which took the position that the rights of employees should be considered in any changes of the rate structure so labor would get its share of such revisions.

● Besides the fact that it was the first rate increase proposal before the FCC, a significant aspect of the proceeding for the telephone industry was the position taken by the telegraph companies about the inroads into their record communications traffic made by the teletypewriter exchange service. The leaps and bounds with which the TWX has increased in public usage both throughout the Bell System and now in the field of the Independent telephone companies were pictured as having serious effect on the telegraph traffic.

Prudent Investment by Law? . . .

With its failure to win the Supreme Court approval of the prudent investment principle in the recent Pacific Gas & Electric case, the Federal Power Commission has sponsored a bill in Congress to enforce that method of valuation through an amendment to the Utility Holding Company Act and the Power Act. The bill, which was introduced by Representative Havenner, California progressive Democrat, was regarded as an attempt by the Administration to win a victory on the use of the prudent in-

vestment valuation "yardstick" through the legislative method rather than having to wait for a future judicial approval.

● While the bill in its present form would affect only the power industry, it was believed that, if the Power Commission is successful in securing the sanction of Congress, it would be only a short time before such an amendment would also be incorporated into the Communications Act. Then both the Power Commission and the Communications Commission would strive to become the bell-wethers to lead the state commissions to translate the principle into their respective state statutes.

OF GREAT significance, the Havenner measure's proposal on depreciation would upset existing treatment of the replacement and retirement reserves in the rate base. His bill would provide that the depreciation reserve should be deducted from the rate base. The California Congressman declared that the depreciation reserves of utilities have often been excessive and imposed a burden on the rate payers. However, the proposal has a long voyage through the House Interstate Commerce Committee with extensive hearings in prospect, then a House vote and finally Senate committee hearings and a Senate vote so many obstacles and revisions, plus the good possibility of a defeat, confront the measure.

REA Agrees to Reimburse Rural Telephone Companies

The Rural Electrification Administration has conceded that it should bear its share of the cost of any telephone construction which is necessitated through interference (not inductive interference) from its rural electric power projects. This position was disclosed in the recent annual report of the R.E.A. to Congress, submitted by its Administrator John M. Carmody.

● "As a matter of policy, the REA has permitted the use in limited amounts of the Government funds it has lent for projects," Administrator Carmody told Congress, "to assist in preventing such interference either by the installation of a metallic return of the relocation of the grounded telephone system. In many instances, however, this total cost has been more than a REA project can afford. Rural Electrification on a broad scale is possible only when all costs are kept to the lowest possible mimimum. In many instances, interference can be prevented effectively only by the virtual rebuilding of a heavily depreciated and obsolete telephone circuit. The burden upon the power and light cooperative is REA to limit sharply the extent to very great. It has been necessary for which funds, appropriated by Congress for rural electrification, can be used for such betterment of telephone lines."

● *The REA Administrator assailed the rural telephone industry for not being constructed under the standards generally prevailing in the telephone industry, but he failed to cite that the telephone industry had been serving the farming regions for years at low rates adequately and efficiently without the aid of government loans. The REA chief also failed to take into consideration that newly constructed plant would necessitate a drastic increase of telephone rates for the rural population. Despite the fact that the REA has lost a number of state commission decisions on the issue of compensating the rural telephone companies for interference, the REA report to Congress tried to make out that the power line was not legally liable to compensate the telephone company which was the prior occupant of the right of way for damages.*

CONVENTION SCHEDULE

Texas Telephone Association, Adolphus Hotel, Dallas, March 23, 24 and 25.

Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, March 29 and 30.

Missouri Telephone Association, Hotel Muehlebach, Kansas City, April 4 and 5.

Iowa Independent Telephone Association, Fort Des Moines Hotel, Des Moines, April 12, 13 and 14.

Nebraska Telephone Association, Hotel Paxton, Omaha, April 19 and 20.

Kansas Telephone Association, Hotel Kansan, Topeka, April 27 and 28.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, Ohio, May 3, 4 and 5, 1938.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 11 and 12.

Wisconsin State Telephone Association, Locally Owned, May 17, 18 and 19, Park Hotel, Madison.

Pennsylvania State Telephone & Traffic Association, Yorktowne Hotel, York, June 2, 3 and 4.

New York State Telephone Association, Seneca Hotel, Rochester, June 7, 8 and 9.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, September 21, 22 and 23.

FCC Study on Telephone Toll Rates . . .

A lengthy factual analysis of the elements which make up telephone toll classes of service and rates was recently published by the FCC Telephone Rate and Research Department, headed by Telephone Rate Counsel Carl I. Wheat. Incidentally, this branch of the FCC, which is existing under an appropriation of the Telephone Investigation, is expected to be ended next June 30, because as yet no move has been made by the FCC to secure additional funds for its continued existence and it is considered most likely that the Commission will not seek any further funds for the branch.

The toll rate study was published as a background for Federal and state commission regulation and did not draw any conclusions. One feature of the report was its discussion of whether the service factor or relative costs of the particular service should be accorded the greater weight in the establishment of the rate. The report declared that it appeared the Bell System had given greater weight to the service factor and the relative cost factor "has apparently been given little attention in designing the present toll rate structures. It added that "a query may be raised as to the effect on both the system and the public of eliminating the relative cost factor to the extent that has apparently been done in developing the existing rate schedules." The report also urged that the greatest standardization and simplification of classes and services gave the public the greatest satisfaction and promoted the greatest use of toll service.

● Telephone Rate Counsel Wheat was slated to give an important address Feb. 20 before the National Lawyers' Guild annual convention in Washington on the problems of interstate telephone rate regulation which may indicate the principles that the FCC, in his opinion, should follow in the regulation of these charges.

Johnston Heads Phone Company

Clarence E. Johnson, general manager of the Interstate Telephone company, was elected president at the annual directors' meeting January 21. He has been vice president since 1936. The office of president has been vacant since the death of S. L. Odegard, in California, in 1934.

United Properties Transferred

Ernest E. Blincoe, chairman of the Kansas corporation commission, announced January 15 that the commission has authorized the Southwestern Bell Telephone Company to take over all of the property of the United Telephone Company and the property of the Scandia Telephone Company in Kansas. The transfer includes both exchange and toll properties of the two corporations.

Included in the transfer are fifty-five exchanges and many miles of toll lines, located in northern and western Kansas. It is understood that formal transfer will be made immediately upon filing of the commission's approval. The merging of the communication systems will place a number of important new stations in Southwestern Bell territory.

Exchanges affected by the order include: Abilene, Almena, Atwood, Belleville, Beloit, Bird City, Blue Rapids, Canton, Chapman, Clay Center, Colby, Concordia, Downs, Dresden, Ellsworth, Enterprise, Frankfort, Gem, Goodland, Gypsum, Hays, Herington, Herndon, Hoisington, Hollenberg, Hoxie, Idana, Jewell City, Kanopolis, Kirwin, LaCrosse, Lincoln, Lindsborg, Lorraine, Manhattan, Mankato, Marquette, Marysville, McDonald, McPherson, Minneapolis, Norcatur, Norton, Oakley, Oberlin, Phillipsburg, Plainville, Salina, Scott City, Smith Center, Solomon, St. Francis, Stockton, Washington and Scandia.

DR. C. J. DAVISSON — DR. L. H. GERMER

Announcement that Dr. Clinton J. Davisson of the Bell Telephone Laboratories with Prof. George P. Thomson of London the 1937 Nobel Prize in physics brings world-wide recognition to the researches of a scientist who has been a member of the Bell Laboratories since their organization. The award to Dr. Davisson is for his demonstration that electrons, the fundamental building blocks of the universe, behave under certain conditions as trains of waves.

The significance of this discovery lies in the fact that it furnishes the first experimental proof of one of the basic concepts of modern physics—that there is an inherent duality in the universe so that under certain conditions matter partakes of the nature of energy, and vice versa. Light is energy, manifesting itself in waves. Electrons are particles of matter. In experiments continuing over a number of years, Dr. Davisson, in association with Dr. L. H. Germer, also of the research staff of the Bell Laboratories, directed beams of electrons against a target of a crystal of nickel, from which the electrons were diffracted in the form of train's of waves—a characteristic of energy.

A. T. & T. Hits Station Peak

Principal telephone subsidiaries of the American Telephone and Telegraph Company gained 31,500 stations in January, lifting the total in service to the highest number in history. The system had a record total number at the close of 1937 of approximately 15,327,000. Total at the end of January was indicated at 15, 358,500, a new peak. In December, 1937, telephone stations showed an increase of 41,700 and in January, 1937, a gain of 96,000.

Illinois Bell Gets Refund

Final decree in the telephone refund case was signed February 5 by Appellate Judge Evan A. Evans and U. S. Dist. Judge James H. Wilkerson ordering the Illinois Bell Telephone Co. to pay $37,000 to the city and $60,000 to the state for expenses they incurred in the fight.

Four years ago the court ruled the telephone company must refund $20,000,000 to subscribers using coin box service. The decree signed yesterday said the company could keep $1,800,000 which was unclaimed.

Westinghouse Research at Mellon Institute

Dr. Edward R. Weidlein, director of Mellon Institute, Pittsburgh, has announced the establishment of an industrial fellowship by the Westinghouse Electric and Manufacturing Company for the study of problems in the field of dielectrics and electrical insulation. Dr. Robert N. Wenzel, a member of the Melon Institute research staff since 1927, has been appointed fellow in charge of this project.

The dielectrics fellowship has as its general objective the development of improved insulating materials and processes for application to equipment of Westinghouse manufacture, and it brings the facilities of Mellon Institute into cooperation with those of the Westinghouse Research Laboratories at East Pittsbrugh in insulation research.

MOVING?
Don't forget your
TELEPHONE!
US WHEN AND WHERE YOU ARE GOING—WELL
EAD OF TIME—SO THAT WE SHALL BE ABLE
GIVE YOU PROMPT TELEPHONE SERVICE.

oving display that actually moves, and sells tele-ne service too. The van in insert moves from right to left

Not Only A Joy Forever

(Illustrations reproduced courtesy New York Telephone Company)

ACT IX

Showmanship in Business

by

ZENN KAUFMAN

WITH nothing to offer but beauty, nature continues year in and year out to pull crowds by the million. Whether it's the beauty of Lake Louise—or the simple attraction of a shady brook—our entire nervous and physical systems react with consistent regularity to the call of nature's beauty. The simplicity of the sea—the variety of beautiful mountains—both act as tonics for our beauty-starved populace.

Fortunes have been made by men who have capitalized this public craving for beauty. Many forms of entertainment are based principally on some kind of beauty. Few forms of entertainment can get along without some kind of beauty. And in merchandising, too, it plays a major part in getting and holding the crowds.

● One battery man is now packaging automobile storage batteries in "ducky-looking" cardboard boxes—with a snake-skin finish. Women buy a large proportion of storage batteries now-a-days and are repelled by the sight of a greasy looking, black battery. It's negative—whereas the snake-skin finish on the new boxes associates itself immediately with fashion and style. The pretty boxes jumped sales. Gotham Hosiery added a beauty appeal to the ordinary silk stocking by rolling it up and putting it on the back of a cute, little Scottie dog. Thus, men bought hosiery as a gift feeling that they were giving something good-looking and sentimental rather than something that was just practical. Western Union doubled its greeting message Business when they put expensive Norman Rockwell painting on their otherwise plain yellow blanks.

Abbot Kimball, advertising agent, once asked his art director if he really thought that beauty paid. The art director replied, "I once ran an ad for a job and secured fifteen replies. I called on you first because your stationery was better looking than any of the others."

The cash value of beauty has been demonstrated in so many ways that I am almost beginning to believe that there is a devastating amount of truth in that old, hackneyed expression: "The first impression is the most important."

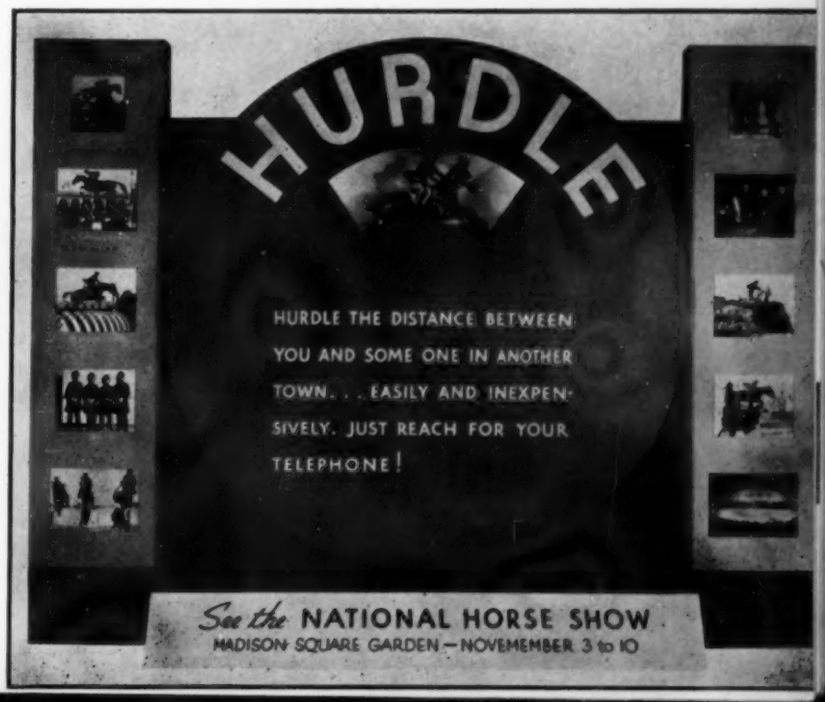
Beauty Makes Them Hungry

● C. A. Patterson, editor of the American Restaurant, tells me that men actually eat more expensive lunches when served by pretty waitresses.

"Do you see that cherry," said a successful restaurant owner to Abbott Kimball, pointing to half a grapefruit, "I get a nickel more for that grapefruit with that cherry in it."

Whether it's the uniforms of the West Point Cadets, the stream-lining of the new railroad trains or the jacket of a new book, we are always caught by a "thing of beauty." Smart manufacturers would not continue to pay thousands of dollars to smart designs like Henry Dreyfus unless beauty paid. Dreyfus redesigned a scale and sales doubled. This is fact — not theory. Beauty is not only a "joy forever," but an active and immediate cash asset.

(Please turn to page 37)


HURDLE
HURDLE THE DISTANCE BETWEEN YOU AND SOME ONE IN ANOTHER TOWN. . . EASILY AND INEXPENSIVELY. JUST REACH FOR YOUR TELEPHONE!
See the NATIONAL HORSE SHOW
MADISON SQUARE GARDEN—NOVEMBER 3 to 10

Publicity tie-up with National Horse Show. The hurdling horse in the insert is flanked by pictures of competing army teams

Minimizing

By B. C. Burden

Transmission Engineer,
THE LINCOLN TEL. & TEL. CO.

● The noise shunt has a range of 0-10,000 noise units in steps as shown in Fig. 7. The instrument is so designed that both the noise across the telephone line (noise metallic) or the *noise to ground* can be determined. Measurement of the noise to ground is helpful in determining the contribution of longitudinal induced voltages on the metallic circuit noise. If the ratio between noise metallic and noise to ground is quite high this is a good indication that the telephone line is well balanced; otherwise, the high longitudinal voltages which are responsible for creating noise to ground would set up considerable metallic circuit noise. It should be noted that longitudinal voltages induced in a telephone line may operate through *series unbalances*, as for example a high resistance splice or poor jumper connection etc., to create appreciable noise

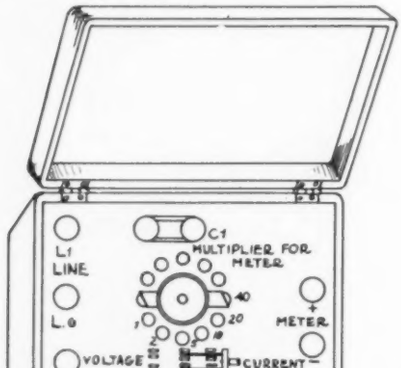


Fig. 7—Sketch showing general appearance of noise measuring unit

in telephone lines even though the telephone lines be well transposed.

The ear balance method of measuring noise has served well and faithfully for many years and still offers the advantage of simplicity and relatively inexpensive apparatus as compared to the newer visual type instruments. At best however it is only an approximation and it is seldom that two observers will get the same results in observing noise by this method. The results; however, are sufficiently close when the observations are made by trained men to be amply satisfactory for most purposes. So as to give some quantitative notion of noise units to those who are unfamiliar with us or application of the ear balance type of noise set, the table below illustrates typical noise limits used by some companies.

Typical Noise Limits and Impairments

Toll circuits—Noise should not exceed 300 units.

Exchange circuits—Noise should not exceed 400 units.

Grounded rural lines involved in substantial parallels will have noise levels ranging from 500 to as high as 9,000 units of noise. In general where there is more than 1000 units of noise the service will be greatly impaired. For good service the limits previously mentioned should be followed. 200-350 noise units are said to represent a noise impairment equivalent to a transmission loss of 3 db.

TIF Meters

● Another instrument used in inductive interference investigations is that known as the *TIF meter*. This instrument is used in measuring the *telephone influence factor of power system* current and voltage waves. Whereas the noise meter gives an actual quantitative reading in terms of noise units or db of the amount of noise induced in any telephone circuit the TIF Meter measures the *inductive influence* of the voltages and currents present on any power system. As has already been explained, the inductive influence of a power system depends upon the harmonic Composition of the power wave and increases as the magnitude and number of harmonics increases. As early as 1919, it was recognized that some means for evaluating the inductive influence of generators, transformers, and complete power systems was needed. For equal lengths of parallel and involved voltages, it was found that one system might offer little or no interference to paralleling telephone lines while another created noise far above the commercial limit. In order; therefore, to get some common basis of comparing the inductive influence of various power parallels or systems, the TIF Meter was designed. It consists essentially of a frequency weighing network having characteristics similar to the network used in the latest types of visual noise measuring instruments a sensitive thermo-couple and D. C. micro-ammeter, and several switching keys. The meter and its associated thermo-couple is so arranged in TIF Meter that it can be connected either as an A.C. micro-ammeter at the output terminals of the weighing network or an A.C. voltmeter at the input terminals of the network.

Use of the TIF Meter

In making measurements, the input terminals of the network are connected to a suitable point in the power circuit whose wave is to measured. A voltage reading at the input terminals of the network is then made by means of the thermo-couple and D. C. micro-ammeter connected as a voltmeter.

● By means of suitable switches, the meter and thermo-couple are then

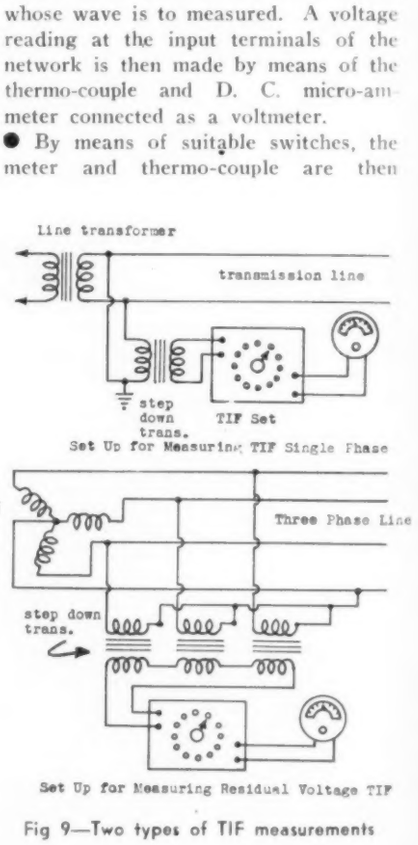


Fig 9—Two types of TIF measurements

Inductive Interference

PART V

switched to the output terminals of the network, and here read the attenuated A.C. current after it has passed through the frequency weighing network. The various harmonic frequencies are attenuated in proportion to their relative interferring frequency, and in accordance with the curve shown in Fig. 3. The numerical value of TIF is then determined by *dividing the current (in microamperes) in the meter circuit of the network by the voltage across the network terminals.* In other words, the TIF is the microamperes output per volt of input to the network.

The TIF for various single frequencies is shown in the table in Figure 8. It will be observed that the fundamental frequency has a TIF of 1. In other words, for one volt impressed on the input terminals of the frequency weighing network, we would get 1 microampere in the output terminals of the network. However, at 1070 cycles for 1 volt input, we would get 12,000 microamperes output. In other words, this frequency would suffer the least attenuation in passing through the network. The TIF of any voltage or current wave is, of course, not the effect of any single frequency but rather the combination of all of the harmonic frequencies impressed in the wave being measured.

New Method of Rating Inductive Influence

● It should be particularly noted that while TIF gives an inductive index of the relative influence from a harmonic standpoint of voltage or current in a given power system or portion of a system, it does not give a quantitative measure of the *total* inductive influence.

In recent years the *Bell System* and *the Edison Institute* in connection with *Joint Committee investigations* have developed a new method of expressing the total inductive influence of a given exposure. In expressing the total inductive influence of a given power parallel from the standpoint of current (electro-magnetic induction) either residual or balanced components as the case may be, it is now the practice to express the total influence in terms of the product of its *magnitude in amperes times its TIF.* This numerical product is referred to as the *I. T. meaning intensity (amperes) times TIF.*

● Likewise, the total inductive influence from a voltage standpoint of any power parallel is expressed as the product of the *voltage in kilovolts by TIF* of this voltage. This being referred to as the *KvT.*

The advantage of this new method is obvious for we know that the greater the current involved in a given parallel, the greater will be the intensity of the magnetic field around the power line; hence, the greater the induction in adjacent telephone lines. However, the severity of the noise due to the current will depend upon its TIF or harmonic content. Thus, by measuring the TIF of the current in question together with the current magnitude we now have a quantity that can be used in making a direct comparison between various power systems or inductive situations.

TIF Measurements

The TIF Meter can be used on voltages up to 700. In general; however, it is recommended that a transformer be used and that the voltage not exceed 250 volts. In making extensive inductive interference investigations, the TIF is measured at various points throughout a system. If in a given system there are several generating units involved, the open circuit TIF of each of the generators involved is measured at the generator using step down transformers. TIF measurement may consist of both phase to phase, and phase to neutral measurements. In general the TIF of several machines may be expected to be

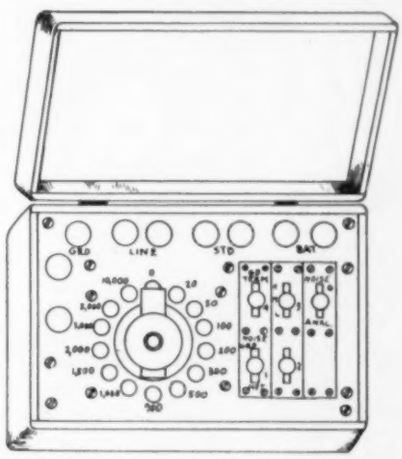


Fig. 10-B—Sketch showing general appearance of TIF meter

higher when measured on open circuit and individually than when they are connected to the station bus.

● The system TIF can be measured near the power source or preferably on the line side of the transformers which feed a given transmission line involved in a parallel under investigation. TIF measurement may be taken at any low voltage light socket; however, such readings may be somewhat distorted due harmonics created by rotating machinery or rectifiers connected to the same circuit. Current TIF measurements are made by voltage reading across a low resistance shunt, which is connected to the power system by means of a current transformer. Figure 9 illustrates the several different methods of making TIF measurements.

Quantitative Significance of the Noise Unit

The noise unit may be quantitatively thought of as equal to one millionth of

(Please turn to page 34)

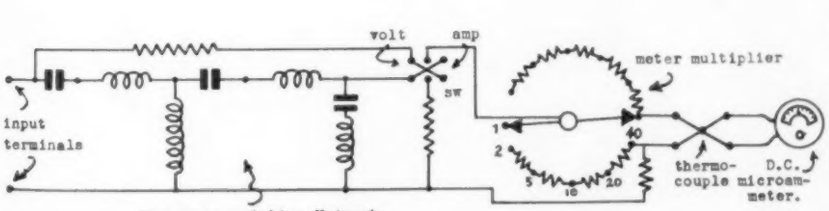


Fig. 10-A—Circuit of TIF meter

Local Test Desk Operation

By C. F. CURTISS

Telephone line wire resistance and other values and methods of calculating.

A VERY important item relative to the proper operation of a telephone system is the resistance of the subcriber's station line wires. Resistance is defined as being a property of any substance which opposes the flow of an electric current through it.

The resistance of a telephone line wire depends upon (1) The substance of which it is composed. (2) The temperature. (3) Cross sectional area, for instance when looking at the end of a cut line wire all that is visible of the wire is a small circle of metal. The area of this circle is the sectional area of the wire. And (4) Length. The resistance of the wire is proportional to it's length, provided the temperature and cross sectional area remain constant, that is, the resistance increases at the same rate as the length of the wire increases, all other conditions remaining unchanged.

● If a line wire is increased to six times, it's original length, the resistance will be six times as great, if it is divided into six equal sections, the resistance of each section will be one sixth of the total resistance, as for example, if the loop resistance of 2.5 miles of rural line wire is 165 ohms.

What is the resistance of 10 miles? By formula: R=L r/l where "L" equals longest length of wire, "l" shortest length, "r" the given resistance and "R" the calculated resistance, therefore, R=L r/l or 10 x 165/2.5=660 ohms.

By ohm, is meant, the unit in which resistance is measured. When measuring a very small resistance the microhm (one millionth of an ohm) is used, and for very large resistance measurements the megohm (one million ohms) is used. The two relations wherein the resistance of a telephone line wire varies directly as it's length and inversely as it's cross sectional area may be combined with a constant (a quantity whose value does not change) giving the equation $R=K\frac{L}{A}$, in which "R" is the resistance in ohms, "L" the length of the conductor, "A" the cross-sectional area of the wire, and "K" is a constant depending upon the nature of the substance of which the wire is made. The physicial meaning of "K" may be readily determined by making the length "L" and the area of the wire each equal to unity, that is, the state of being one.

● Only two values of "K" are in common use, and they are the specific and mil-foot resistance.

● Specific resistance is the particular resistance a substance offers to the passage of electricity through it, compared with the resistance of some standard substance. The mil-foot resistance is a standard consisting of a wire one foot in length and 1/000 of an inch in diameter. If "L" is equal to one foot and "A" is equal to one circular mil., in the forgoing equation, "K" will be numerically equal to "R". The circular mil is the area of a circle whose diameter is one mil or 0.001. Therefore, the C. M. (circular mil) area of any round wire when it's diameter in inches is known can be obtained by means of the formula $C.M.=d^2$, where d^2 equals diameter in mils, squared, that is, multiplied by itself, and C. M. equals circular mil area. Example: What is the circular mil area of a wire 25.35 mils in diameter? C. M.= d^2 or 25.35 x 25.35=643 circular mils.

The value of "K" for copper and iron wire at 68 degrees Fahrenheit is given as 10.79 and 63.35 ohms respectively. Example, calculate the resistance of a copper line wire one mile long having a diameter of 104 mils. By formula:

$R=K\frac{L}{A}$ or 10.79 x 5280/104 x104 =5.17 ohms.

Given the resistance and area of a line wire it's length may be found by the formula: L=RA/K, that is, the length of any wire is equal to it's resistance multiplied by it's circular mil area, and it's product divided by the resistance of a mil foot or "K". The area may be determined by the formula: $A=\frac{LK}{R}$

Example: What is the circular mil area of 5280 feet of iron line wire, if it's resistance is 28.46 ohms. A=LK/R or 5280×63.35/28.46=11881 C. M.

The diameter may be calculated by the formula: $d=\sqrt{\frac{KL}{R}}$, or simply $d=\sqrt{C.M.}$. Example: Find the diameter of the line wire mentioned in the foregoing problem? $d=\sqrt{C.M.}$ or $\sqrt{11881}$ equals 109 mils. The constant is found by the formula $K=\frac{d^2R}{L}$ or 109×109×28.46/5280=63.35, and the length by $L=\frac{d^2R}{K}$.

● Given the area of a line wire it's weight per mile may be calculated either by the formula: $W=\frac{d^2}{62.5}$ or formula: $W=0.015983 \times d^2 \times d_2$.

Example: What is the weight per mile of 104 copper line wire? $W=\frac{d^2}{62.5}$ or 104 × 104/62.5 = 173 pounds, or $W=0.015983\times d^2$ or .015983×104 ×104=173 pounds.

The resistance per mile may be determined by the formula $R=56970/d^2$ or 56970/104×104=5.17 ohms. For iron line wire the weight per mile is found

GALVANIZED IRON LINE WIRE
B. W. G. (Birmingham Wire Gauge) English

Size	Diameter in Mils	Weight Per Mile —Pounds	Breaking Weight —Pounds	Resistance per mile in ohms EBB	BB
9	148	305	915	15.44	18.06
10	134	250	750	18.83	22.04
12	109	165	445	28.46	33.30
14	83	96	288	49.08	57.44

TABLE 1

by either the formula: $W=d^2/72.13$ or Formula: $0.0139\times d^2$.

In calculating the resistance of line wires the temperature coefficient of the material comprising the wire is taken into consideration also. The coefficient of a material is defined as the decimal part of it's resistance at a certain initial Centigrade temperature that the material will change in resistance for every change of one degree in temperature. For most wires the coefficient is positive, that is, an increase in temperature indicates an increase in resistance.

● In determining the resistance of a wire at a certain temperature, the resistance at a stated initial temperature should be known so that the proper coefficient may be used. For an initial temperature of zero Centigrade, the temperature coefficient for copper is 0.00427, which for an initial temperature of twenty degrees Centigrade, the coefficient is 0.00393. Thus, if a copper wire has a resistance of 25 ohms at 20 degrees Centigrade, what is it's resistance at 100 degrees Cestigrade? Formula: $Rt=Ro[1+(at)]$, in which "Rt" equals resistance at a rise or fall of temperature, "Ro" resistance at the initial temperature, "a" the temperature coefficient, "T" number of degrees rise or fall in temperature, and 1 the value of which is the amount one ohm would increase or decrease in resistance when subjected to a rise or fall of one degree in temperature. 1 is usually considered to represent unity. Solution: For a temperature rise of 100 degrees minus 20 degrees equals 80 degrees, actual rise, then $Rt=Ro\ [1+(aT)]$ or 25 X (1+0.00393 X 80), that is, $80 \times .00393 = .31440 + 1 = 1.31440 \times 25 = 32.86$ ohms.

For a decrease in temperature the formula is $Rt=Ro[1-(aT)]$. To change Centigrade to the Fahrenheit system of temperature. Example: Convert a reading of 20 degrees Centigrade to Fahrenheit. $F° = C°9/5 + 32$ or $20\times9=180/5=36+32=68°F$.

To change back to Centigrade $C° = (F°-32)5/9$ or $68-32=36X5=180/9 = 20°C$.

● The various sizes of wire used in the construction and maintenance of a telephone system are usually designated by their gauge number rather than by a statement of the area of cross section. There are a number of different wire gauges, but only three are used to any great extent by telephone operating companies. These are the A.W.G. (American Wire Gauge) and originated by the Brown & Sharpe Manufacturing Company, the N. B. S. (New British Standard), and B. W. G. (Birmingham Wire Gauge). The last two are English gauges and commonly used in the construction of open wire lines. Figure 1, 2, and 3 are tables showing the gauge, resistance, and etc., of some of the most common sizes of telephone wire.

HARD DRAWN COPPER LINE WIRE

N. B. S. (New British Standard) English

Size	Diameter in Mils	Weight per Mile—Pounds	Breaking Weight—Pounds	Resistance per mile in ohms
10	128	262	820	3.2810
12	104	173	549	4.9701
14	80	102	330	8.4005

TABLE 2

The following rule will enable one to determine the resistance of any size copper wire without reference to a wire table. By remembering that a number 10 (B&S) gauge wire has a resistance of approximately one ohm per thousand feet, an increase of one in the number of a wire increases the resistance twenty five per cent, an increase of two in the number increases the resistance sixty per cent, an increase of three in the number doubles the resistance, and an increase of ten in the number increases the resistance ten times.

● To find the resistance of any number, multiply the resistance of the preceeding gauge number by 1.26 or divide the resistance of the following gauge number by 1.26.

Example, Compute the resistance per thousand feet of number 14 copper wire without reference to a table. A number 10 wire equals 1 ohm, the resistance of a number 13 (an increase of three in number doubles the resistance) is 2 ohms and $1.26\times2=2.52$ ohms and is the resistance of the gauge 14 wire. Compute the resistance per thousand feet of number 12 copper wire. The resistance of number 13 wire is 2 ohms, therefore $2/1.26=1.58$ ohms, or resistance of No. 12.

Problem 1. If the resistance of a rural line wire 9 miles long is 300 ohms, what is the resistance of 13 miles of similar wire? Solving by means of proportion L 1, L2 ::R1:R 2, or 9: 13::300 :X, that is, $X=13\times300=3900/9=433$ +ohms.

Problem 2. Two number 12 copper line wires 17 miles long have a resistance of 85 ohms each. One of these wires becomes grounded and when measured shows a resistance of 53 ohms to the ground. What is the length of the wire to the fault? 85:53::17:X or $X=53\times17=901/85=10.6$ miles to fault.

Problem 3. Compute the resistance of a 104. N. B. S. gauge copper line wire 3 miles long weighing 519 pounds. By formula: $R=l^2W/w$, where "l" equal length in feet, "W" the resistance of a foot—grain of pure hard drawn copper wire and is 0.22064 ohms, and "w" the total weight in grains. 7000 grains avoirdupois weight equals one pound.

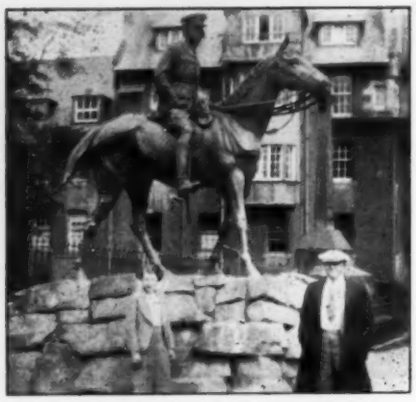
Solution: $R=L^2W/w$, or $(5280x3)^2X-.22064/519X7000=15.1$ OHMS.

B & S (Brown & Sharpe) or A.W.G. (American Wire Gauge)

Size	Diameter in Mils	Pounds per Mile	Resistance per Mile is Ohms	Kind of Metal	Principal Use in Telephone Operating Practices
13	71.97	82.80	10.56	Annealed Copper	Toll cable conductor
14	64.08	76.19	13.33	"	Station protector ground wire
16	50.82	41.28	21.17	"	Toll cable conductor
17	45.26	——	Approximately 44% of copper	Bronze	Parallel drop wire
19	35.90	20.60	42.44	Annealed Copper	Exchange aerial cable conductor
20	31.97	16.32	53.54	"	Bridle wire
22	25.35	10.27	85.11	"	Exchange aerial cable conductor and station inside wire
24	20.10	6.46	135.53	"	Exchange underground cable conductor
26	15.94	4.06	215.16	"	Exchange underground cable conductor

NOTE: The resistance values given do not take into account the increased resistance in the wire effective length due to spiralling when manufactured into a lead covered cable.

TABLE 3



The author (right) at famous Edinburgh Castle, posing in front of monument to Earl Haig

A Pioneer Reports On Europe

By P. Kerr Higgins

This month Mr. Higgins recounts his impressions of France, and the International situation as he sees it. Written in Nov. 1937.

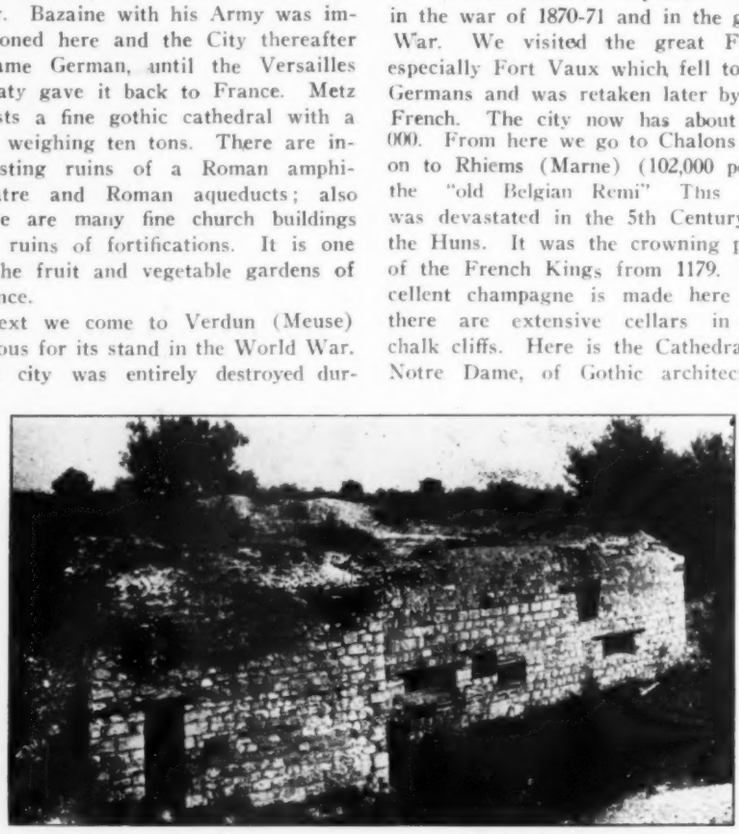
IN DEAR OLD FRANCE

●France was old when Jesus was born. One can go almost anywhere in France and find much interest. We arrived in Strasbourg on Sabbath morning and went to the fine Cathedral, where we saw the most beautiful religious flower procession we have ever seen anywhere. Combined with this was a confirmation service. There were Archbishops, Bishops and other clergy in their beautiful robes and a host of young people being confirmed. These together with the beautiful banners, altars and marvelous floral pieces, and the lovely young girls in their filmy white dresses and veils, made a spectacle never to be forgotten. There were several thousands of people in attendance and we had to stand during the entire service. The city with a population of 175,000 is a pretty lively old town. It is the spiritual and economic metropole of the Alsace Region. Naturally there are many Germans numbered among the inhabitants. The River Ill flows through the city. There are many narrow streets and houses with beautiful wood carvings and feudal houses built of red sandstone. The new town is built along modern lines. The Cathedral dates back to the 11th Century, is rich in sculpture, and has a beautiful rose window.

Our next stop was Nancy, population 115,000, with its famous Thiers Square, beautiful bronze statues, the Stanislas Gate and also beautiful Stanislas Square, with trellised gates, bronze monument and two wonderful fountains. Then too there are many fine Government buildings, a Triumphal Arch, an imposing University, a Cathedral, many private palaces, botanical gardens, etc. We cannot forget Nancy as here we had our finest meal in France, right on Stanislas Square.

● Along a beautifully shaded road, we drove to Metz (population 70,000). This City became French in 1552 and was a strong fortress in the 17th Century. Bazaine with his Army was imprisoned here and the City thereafter became German, until the Versailles Treaty gave it back to France. Metz boasts a fine gothic cathedral with a bell weighing ten tons. There are interesting ruins of a Roman amphitheatre and Roman aqueducts; also there are many fine church buildings and ruins of fortifications. It is one of the fruit and vegetable gardens of France.

Next we come to Verdun (Meuse) famous for its stand in the World War. The city was entirely destroyed during the War and has since been rebuilt, principally with American funds. The Treaty of Verdun was signed in 843. Verdun was an important center in the war of 1870-71 and in the great War. We visited the great Forts, especially Fort Vaux which fell to the Germans and was retaken later by the French. The city now has about 12,000. From here we go to Chalons and on to Rhiems (Marne) (102,000 pop.), the "old Belgian Remi" This city was devastated in the 5th Century by the Huns. It was the crowning place of the French Kings from 1179. Excellent champagne is made here and there are extensive cellars in the chalk cliffs. Here is the Cathedral of Notre Dame, of Gothic architecture.



Battlefield scene, illustrating entry to fort where a large number of French heroes died valiantly

The front and rear were badly damaged in the World War and have not yet been completely repaired. The front was considered the most beautiful Gothic front in the world. We also found many interesting old Roman remains and ancient houses, relics of the past.

● Our next stop is Paris. As we had been in Paris on previous trips to France, our interest this time centered at Versailles, a city of 70,000. To us, it was the finest suburb of Paris and we thoroughly enjoyed the drive through the beautiful parks enroute and in the city proper. The beautiful castle built by Louis XIII as a shooting lodge has been elaborately furnished by his successors with marvelous gardens, fountains, grottos, ponds and statues, Versailles was the residence of the royal family until 1789. It has been the center of important International Conferences, the headquarters of William I, proclaimed Emperor in 1871 and 1919 the Peace Treaty was signed here. Magnificent war pictures adorn the walls. In the gardens, laid out at a cost of 500,000,000 francs, are to be seen the orangery, small and large, mirror fountains of Apollo and Neptune, which are a most beautiful sight (when playing) and which every tourist endeavors to see. Another interesting sight is a gorgeous ball room, St. Louis Cathedral and Church of Notre Dame.

● PARIS. So much has been said of this City of nearly 3,000,000 souls that we cannot do it justice. It is the intellectual and commercial life of the Country. The exposition although open was not completed when we were there. The River Seine flows through the city and there are thirty bridges within the city limits. A whole book could be written and then not cover the numerous interesting places to be seen. Weeks and months could be spent to advantage, and even then one would not know Paris. One must live for some time in such cities as Berlin, Paris and London to be able to see them as they deserve to be seen. But we must hurry on after a brief visit and head for the north. Enroute we visited Compeigne Soisson, Balleau Woods, Chateau Thierry, stopping to visit the American monuments and cemeteries, St. Quinten, Cambrai, Arras and Calais. Thence on to Ostend, a beautiful summer resort on the Belgian coast, where we took our steamer for Dover.

● During our two months tour of Europe by auto, which brought us in close contact with "The People", we were impressed with the fact that the people generally did not favor war and all that is needed is a strong leader to bring the present Rulers to their senses.

● The Rulers want to remain in power, —hence they had to do some "good" things for their countries or they would have been ousted. Under present plans, no nation will openly declare war or even seek a pretext. The plans call for "taking what you want a little at a time." The day of fair fighting is gone and the policy of "Anything is fair in love or war" is the new way of doing with the feeling that the law of "Might and Right" is dominant throughout Europe and Asia today. Everywhere the comment was made that present conditions were brought about by, first, sending the wrong men as representatives to the conferences (politicians instead of hard-headed, successful business men); second, in order to keep peace, minor things were allowed to accumulate until they became major, when it was too late to take definite action; third, mob rule took the place of sane government; and, fourth, people became more and more afraid to express themselves.

● Evidently the aim of the present rulers is expansion, grabbing off a little at a time small defenseless countries. Germany has eyes on Czecho-Slovakia, the Ukraine and central Europe; Italy has Ethiopia and wants Spanish Morocco,—possibly Spain—and control of the Mediteranean. They will not be satisfied with these however. No small nation will escape this ruthless expansion.

Two schools of thought are at work, — Communism and Fascism, with Democracy as the Umpire. They may soon turn on Democracy if the latter keeps on yielding valuable ground. Democracy does not want war and so the Fasticts are doing a lot of "bluffing" and "getting away with it". Germany, Italy, Japan (Fascist nations) and some few other small nations apparently have a working agreement. This is one of the reasons Germany concentrates on her army (especially aviation) and not on her navy; she has Italy and Japan to draw on when the time comes.

● Ethiopia was only the opening chapter of this New Era Book. It remains to be seen how long Italy can get away with twisting the Lion's tail in the Mediterranean.

A definite plan seems to have been agreed upon between the Fascists nations and they will keep on grabbing the small units until stopped.

German policy of dechristianizing the nation may be its undoing if not stopped. A strong undercurrent against this practice is at work in Germany now. This may be the reason a modern fortress covering eight square miles has been erected around its rulers in the Bavarian Alps.

Today Europe is not being governed for the good of all. It is ruled for the benefit of its "masters". Too bad we, in this favored land, cannot or will not

(Please turn to page 31)

S. O. S.

Safety Or Sorrow

In the wide range of utility field there is a great number of motor vehicles operated. It's time for us to step out and guard against accidents.

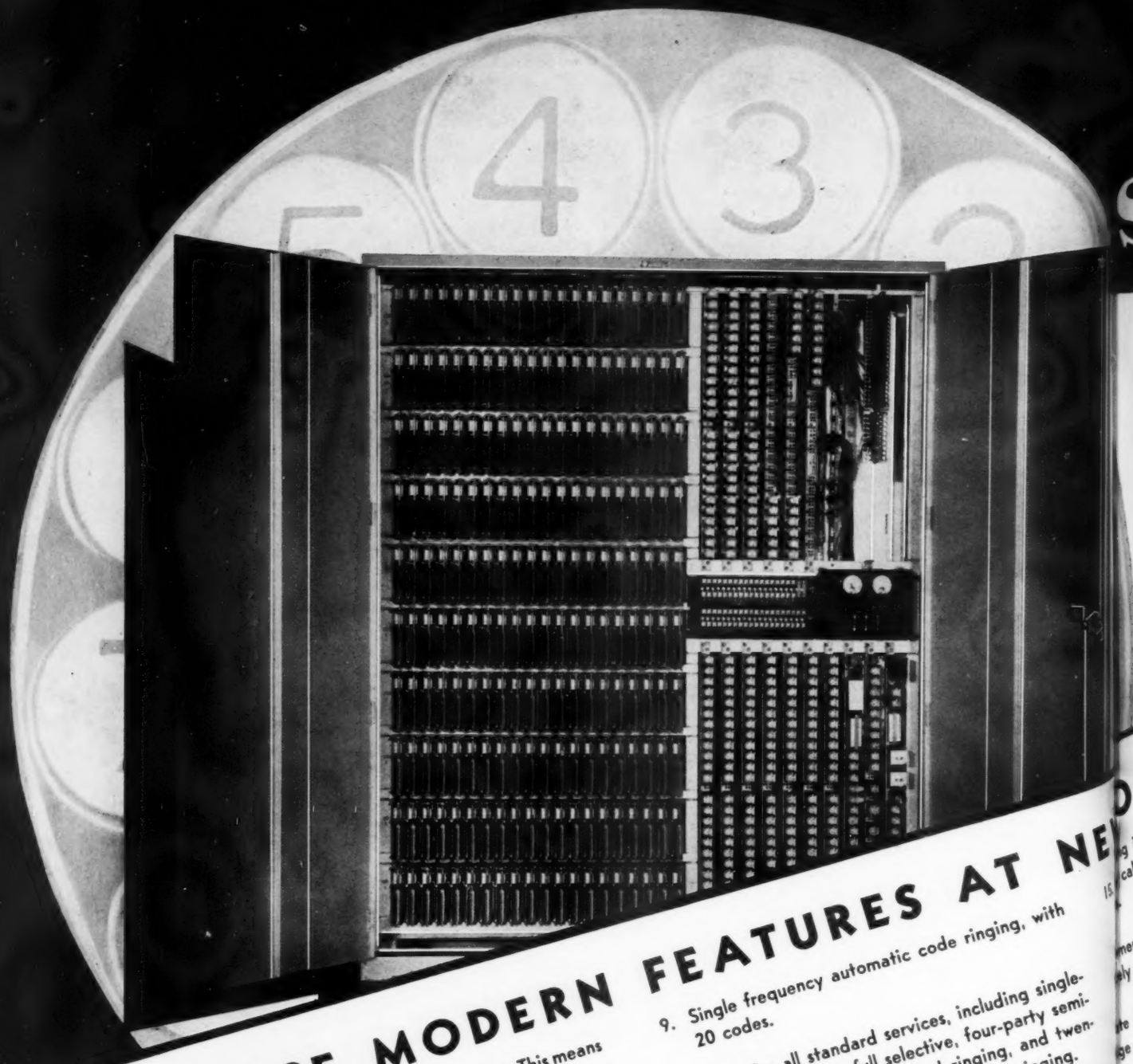
Motor vehicle accidents increased from 37,800 to 40,000 during the period of one year from 1937 to 1938, and is increasing every year. If we don't take a hand in the precaution of such accidents a member of your family may be one of those killed.

When we are operating a car whether on business or pleasure remember these few simple rules.

1. **Never approach an intersection at a high rate of speed.**
2. **Always have good brakes.**
3. **Never pass a car on a curve.**
4. **Avoid speeding when shifting gears in starting car.**
5. **Be doubly cautious in school zones.**
6. **The most important of all, USE COMMON SENSE.**

Let's co-operate and help STOP accidents. This is not impossible if we all do our part. Always remember, S. O. S. means safety or sorrow.

By B. E. HARDIN



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g indication to calling party on
calls, including those on divided

ment used on reverting calls released
ly upon answer by called party.

te facilities provided for full tandem
ge operation.

mission bridges in link circuits use repeat-
coils, permitting universal service.

uipment instantly released when calling
rty hangs up.

Available in capacities from 10 lines and up.

Automatic Rotor Relay Switchboards are universal in their application to small telephone properties. No matter whether your exchange has magneto or common battery telephones, grounded or metallic lines, or any combination of these, there is an Automatic Rotor Relay Switchboard that will fit your conditions perfectly, and provide your exchange with every modern approved service feature.

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LINE and DESK

RAY BLAIN, Member A. I. E. E., Editor

Q. We are having considerable difficulty with switchboard lamps growing dim gradually until they cannot be easily seen by the operators. Please advise how the difficulty may be corrected.

A. There is a possibility that your battery voltage is low at times. This should be immediately checked and corrected if necessary. Switchboard lamps do gradually grow dim with long use and must eventually be replaced as even the best will not last forever. An old switchboard lamp can be detected by the black deposit on the inside of the glass. While the filiment may still glow this deposit does waste a large percentage of the effective light in the opal.

Q. We have about 500 feet of 100 pair cable which was recently removed from an underground conduit. This cable tests good though the sheath is bent and flattened considerable in places. Would you consider this cable satisfactory for reuse.

A. This cable has no doubt been in use for several years and no doubt the total depreciation will equal its first cost. If this old cable is reused a saving would be realized at the present time but there is a probability that the cost of clearing trouble on it would soon equal the cost of the necessary new cable. Our experience over many years has indicated that it is almost impossible to recover cable and reuse it without causing some damage which will soon cause trouble. In our opinion it is always best to use new cable on all additions to the permanent plant.

Q. What type earth boring machine do you recommend for general hole digging for an average telephone company?

A. This would depend almost entirely on the preference of the company concerned as manufacturers of Earth boring machines will be glad to recommend a type best suited to your particular needs. The earth boring machine may be mounted either on a tractor or truck. One of these machines will bore from 75 to 100 holes 7 to 10 feet deep per day when operated by a two man crew. They will bore through frost, shale rock and hardpan, swamps and sand or gravel. Holes may be dug for the smallest pole or up to 48 inches in diameter. The digger may be equipped with a leveling device so that the auger may be swung to any angle for digging anchor holes. This device also permits the hole to be drilled straight down regardless of the position of the truck or tractor.

Q. What is the difference in resistance between 22 and 24 gauge telephone cable?

A. The 22 gauge cable runs about 62.05 ft per ohm whereas the 24 gauge is only about 39.02 ft. per ohm.

Q. In the adjustment of relays is it necessary that the springs be kept perfectly straight?

A. Ordinarily all springs on a relay shall be straight with no sharp bends or kinks in them. A gradual bow though between the clamping block and the point of a spring is generally permissible.

Q. What special tools are required to install the intermediate type of drop wire clamp?

A. An ordinary pair of linemans pliers are used to install these clamps or as they are generally called clips. The binders on the clips should be bent down evenly and tight on the drop wire.

Q. What method may be best used to clean telephone relay contacts?

A. Special contact burnishers can be purchased at a reasonable cost which do a good job with no danger of causing harm to the precious material. Special seal bond paper cut in strips is also often used to advantage for contact cleaning.

Q. We are planning on grounding a small exchange to a cold water pipe and our ground clamps are all too small to take the necessary large wire. What would you recommend for this purpose?

A. We suggest that you go to some telephone or electrical supply house and get a large sized ground clamp. The kind equipped with a special lug for sweating-in the large ground wire is considered a very good type. Sometimes a smaller ground clamp can be used by placing a lug on the wire for attaching to the ground clamp.

Q. What type of jumper wire reel is considered best for mounting on main frames?

A. The size of the reel can best be determined by the size of the main frame and the amount of wire it must contain. On the small frames a reel to mount between two of the uprights will usually be large enough. These small reels can usually be easily constructed locally with metal ends tacked on the wooden spindle. A long bolt should extend through the center wooden part for mounting.

Q. What precautions should be taken by the operator of a paint spray when working in a confined space?

A. The wearing of a protective mask on all such work is always desirable. Tsese masks gneerally consist of a rolled aluminum holder so soft and pliable that they fit closely over the nose and mouth. This holder accomodates filter pads or refills consisting of non-absorbent cotton web between two layers of cotton gauze. These masts and refills can be purchased at a very low cost. They can also be used to advantage in any dusty location or when buffing, grinding or sanding.

Q. Is there any danger of causing injury to our pole derrick when using it to pull poles?

A. This never happens when used in the manner specified by its manufacturer and not excessively overloaded. When a pole is especially difficult to pull we first run the winch line over the rear pulley on the truck to a hitch near the ground line on the pole. A pull in this position will start the pole and loosen it so that it will come out the rest of the way easily. The line can then be placed over the top of the derrick to finish the pull and lower the pole to the ground.

Q. What means may be used whereby an open fuse on a telephone battery supply may be easily and quickly detected?

A. Various methods could be used but we believe the most convenient, cheapest and one of the best is to utilize the indicator type fuse. These fuses have a neon light permanently attached to them which indicates immediately when a certain fuse blows. This neon light is encased within a rigidly constructed handle which is secured to the fuse and therefore serves also as a perfect fuse puller. The lamps used for indicating purposes are very rugged, have extremely long life and use no measurably amount of current. These fuses may be purchased at a reasonable cost.

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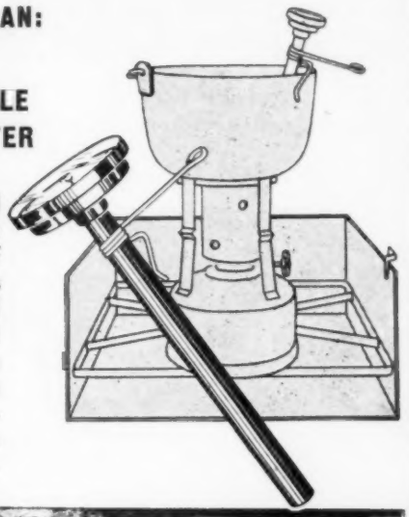

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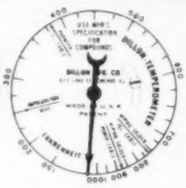

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Output 20 Watts, 90 Volts Operates on 110 Volts A.C.

(For loads 40/50 watts, write for information about Model "C.")

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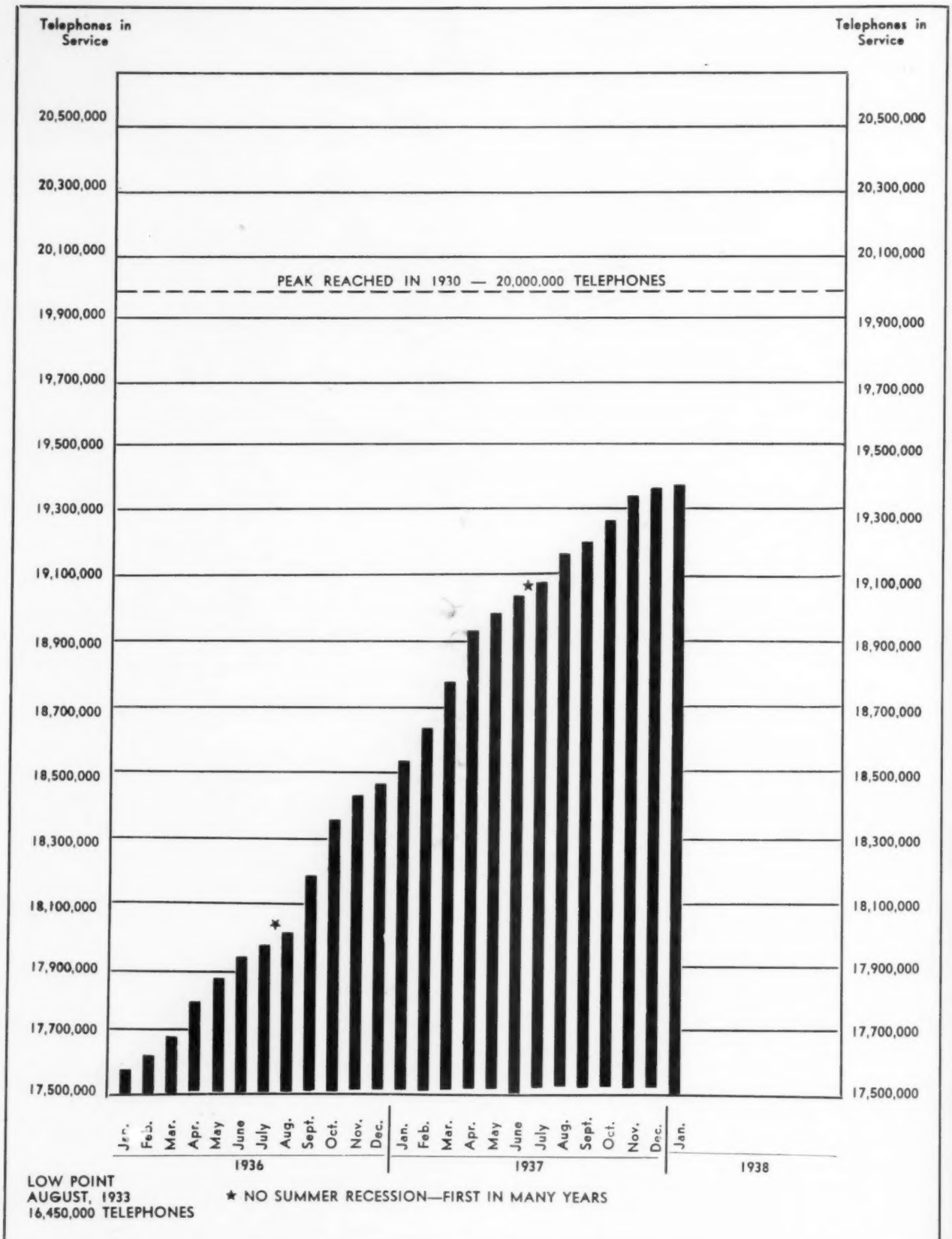


A Pioneer Sees Europe

(Continued from page 25

read the "hand writing on the wall." Slowly, but surely our masses are eating out of the garbage cans of Europe, inviting disaster.

War, if and when it comes, and it seems as though it must come soon will be a massacre of the innocents. The plan seems to be the poisoning of all water supplies, so as to demoralize the people. Aerial rockets, air mines and poison gas will be relied upon to produce results. The results of the invasion of China and Spain will clarify the atmosphere to some extent and decide the possibility of an open break.

● A wave of religious persecution is passing over the world today and is unequaled in its bitterness and persistency.

The various denominations are much to blame as they have gradually but constantly let down the bars and religious services, especially among the Protestants, have in many, many cases been reduced to one formal service a week. Pastors have mostly become not sacrificial, but mercenary. No visitation among members and as little exhortation as possible.

Present conditions are not the will or wish of the people—only the dream of tyrants and idealists with no practical experience in good government "by the people and for the people." Camouflage is the order of the day and their actions are so covered up as to deceive any one, especially the unthinking.

The same ear-marks are seen wherever a dictator or a would-be dictator is in power. Witness the conditions existing in the Irish Free State, perhaps the most pathetic episode on earth.

Only a radical change in human nature and a universal "Love thy neighbor" policy can bring peace to a distressed and troubled world. This is not impossible, but much education along these lines will be needed and will be slow in gaining momentum. Science has done much to undo world peace, but who knows but it may be the instrument to bring about peace sooner than we expect or think possible.

● Everywhere we went we heard rumblings of dissatisfaction with the present trend of world affairs and so we concluded that revolutions and more revolutions are likely to be the result. The rulers realize this and so keep holding the War God before the people, in an effort to cancel this wave of discontent.

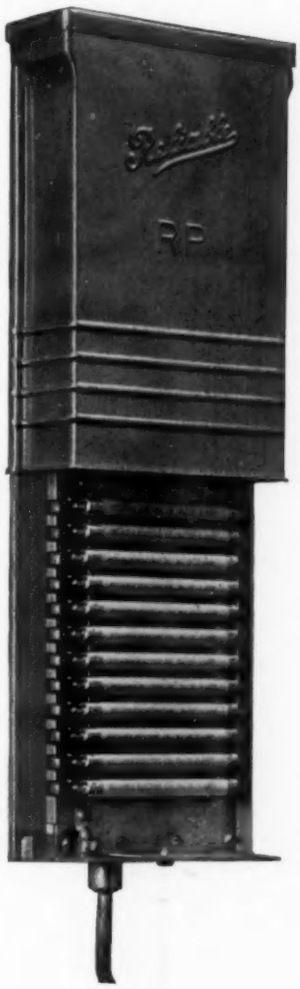
Huge armaments are necessary by the Fascist nations in case the "bluff" fails. The present tendency is to imitate the Spartan regime by developing the physical to the elimination of the spiritual. This can only lead to war. It is the old method

(Please turn to page 39)

Reliable

"RP"

CABLE TERMINAL



This new RP is a reversible protected cable terminal, compactly designed and made of corrosion resistant aluminum alloy throughout, resulting in a very light-weight but substantial structure. It is available in one to six pairs.

The RP27 is equipped with No. 27 wood fuses. The RP56 is equipped with No. 56 asbestos lined fibre fuses. Weight with stub 9½ lbs.

FEATURES

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Detachable mounting bracket
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Reversible sliding cover

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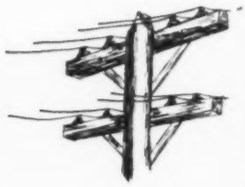


R. A. Clark, Jr.

The Future Trends in Communication

● The art of fortune telling continues to thrive because we have a desire to know what the future holds in store for us. The prediction of future trends in engineering is on a somewhat higher plane than pure fortune telling although, judging from past experience, it sometimes is hardly if any, more accurate. Nevertheless, I believe all of us are interested in what form future communication may take and it should be worth while to discuss what may take place during the next few years. This may not all occur in the next five or ten years, however, the schemes and ideas which are presented have been developed beyond the experimental stage and many of them could be put into practice at once if the demand warranted.

There is a definite drift to oral rather than written message transmission, however, with the improvements in transmission of the written message now in the offing we may look forward to the telegraph supplementing, if not replacing, the mail. Even today it is almost as cheap to send a message by wire as by train.

In the telephone system there is little improvement ahead so far as the voice transmission is concerned. The method of handling calls today is fast and reliable, likewise quality and volume can be made satisfactory. Perhaps there will be a trend toward automatic dialing of distant points although there are several disadvantages to this scheme and we will undoubtedly in most cases have long distance operators to handle our calls. Conference service will undoubtedly be extended. This enables several parties to be connected together for a general discussion. It may be possible in many cases to install a loud speaker system in a conference room and arrange group discussion between several points. However, in the main, conference service will be via the ordinary telephone in which the operators will connect three or more parties together to discuss matters amongst themselves the same as if they were in a room together.

● In the field of written communication we may look for radical changes to speed up and decrease the cost of service. Both the hand morse telegraph and the printer as used today are exceedingly wasteful of man power. Consider for example, the transmission of a typical message over a railroad circuit say from Chicago to Topeka, Kansas. Assume there is a printer circuit available from Chicago to Kansas City and a hand morse telegraph wire from Kansas City to Topeka. Let us follow the telegram originating at Chicago from the time it is dictated until received at the desk of the person, to whom it is directed. The message is first typed by the sender's secretary and taken to him for signature and approval; it is then handed to a messenger who delivers it to the telegraph office. A second messenger carries the message to the printer operator on the Kansas City wire who retypes it for transmission to Kansas City. At Kansas City a second operator inspects the message and hands it to a third messenger who carries it to the third telegraph operator on the Topeka wire who by means of the slow dot and dash system transmits it to Topeka where it is copied by a fourth operator and given to a fourth messenger who either takes the message direct to the recipient or hands it to a fifth messenger for delivery. The expense, lost time and possibility of error in the above procedure is obvious.

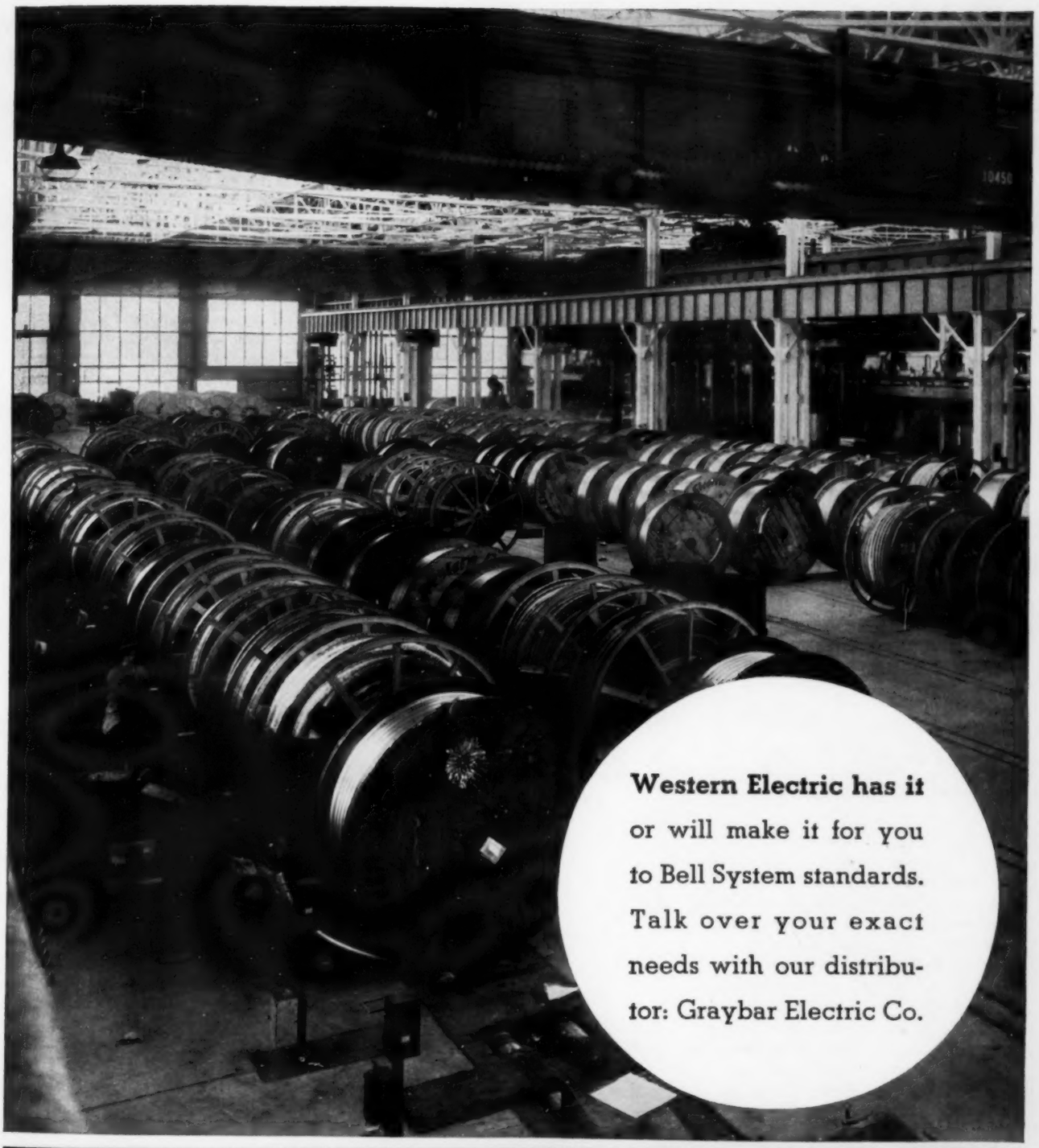
How will such a message be transmitted in the future? The secretary after obtaining approval of the message will place the typewritten page in a machine, dial a number as in placing a telephone call and within a few minutes the message will appear on a sheet of paper in the office of the person to whom the message is directed. Perhaps the operation will be slightly different but in principle this is what we may look forward to. We may not necessarily eliminate all of the labor involved in transmitting the message but it will be directed in a different manner, namely in the maintenance of equipment rather than in the routine transmission and relaying of messages. In the old method as outlined above there is approximately seven possibilities for an error which might not be detected. In the future scheme there would be no possibility of an error because the reproduction is an exact copy of the original. Any trouble on the circuit would result in a copy which could not be read at all rather than one which might have a small error in it.

Another field which offers future improvement is that of remote indication. On the railroad the dispatcher desires to know where his trains may be at any given time. In electric power transmission dispatcher desires to know what the loads are at various points also what position the switches are in. Along the pipe line a dispatcher desires to know the level in the tanks along the line; also at what rate the pumpage is. All of

— Safety Bulletin —

The modern plant man knows that accident prevention efforts in the telephone industry should not become mere routine but rather that accident prevention measures requires constant application.

If it's cable you're after–



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LEAD COVERED CABLE AND TELEPHONE APPARATUS

these indications can be made available to him by means of remote indicating mechanism. The dispatcher will have before him various keys and indicating signals. By merely pushing a button he can within a few seconds obtain the information which he may desire.

So much for the operating side of the picture. Now let us discuss the methods by which these results will be obtained. In the field of telephony the conference circuit can be set up by means of multiple jacks whereby two or more circuits can be connected together in such a way that the over-all transmission will be unimpaired. By maintaining all circuits within reasonable transmission limits they may be connected together without difficulty.

By taking advantage of new developments especially carrier current systems both telephone and telegraph communication can be greatly extended without increasing the wire facilities. Except in very few instances the entire message load of the average utility communication system can be carried over one circuit either open wire or a two conductor coaxial cable. Such a cable consists of a single copper wire enclosed in a copper tube and properly insulated therefrom. The pole line of the future will consist of one cross-arm containing six or eight wires. One pair of these wires will be used for short haul business, the other wires for long haul circuits, one pair being emergency or standby. Telephone conversations will be carried on over carrier channels in the same manner as today. Written message transmission will undoubtedly take the form of facsimile utilizing the same voice telephone circuits. Equipment for this purpose is already developed for use in transmitting printed messages over the radio broadcast channels.

● There are also several possibilities in the extension of printer service using equipment sufficiently low in price to enable the units to be placed directly in every office the same as a telephone. Connections would be established the same as for telephone conversation thus enabling the two terminals to communicate directly with each other. This scheme is obviously not as satisfactory as facsimile for the transmission of messages as it does not permit the sending of sketches and the like. Furthermore, it necessitates the retyping of the message if it must be checked before transmission. However, even with this scheme the labor cost is greatly reduced as is also the possibility of errors.

In the future articles we will discuss more in detail some of the equipment which can be used for the purposes covered above. In the meantime, we should plan for the gradual reduction of the pole line and open wire plant keeping in mind that a few pair of well transposed copper wire of sufficient strength to withstand ice and sleet loads will adequately carry our future communication.

Wesley M. Angle Sails For Australia

Now on the high seas bound for Australia, Mrs. Angle and President Wesley M. Angle of the Stromberg-Carlson Telephone Mfg. Co., of Rochester, N. Y., and the Stromberg-Carlson Telephone Co. of Canada, Ltd., of Toronto, Ontario, sailed January 19th from Vancouver, via the S. S. Niagara.

WESLEY M. ANGLE
President, Stromberg-Carlson Telephone Mfg. Co.

Mr. and Mrs. Angle will join Mr. Leslie P. R. Bean, President of Stromberg-Carlson (Australasia) Ltd. with whom they will inspect the new, modern factory completed last year to house the Australian affiliate of the far-flung Stromberg-Carlson telephone interests. The new plant combines the design and manufacturing operations formerly performed by five factories.

The Angles will witness celebrations in connection with the 150th Anniversity of the founding of Australia, to which the United States is sending a portion of the fleet.

Awarded Edison Medal for 1937

Gano Dunn, president of The J. G. White Engineering Corporation of New York for twenty-four year, has been awarded the 1937 Thomas A. Edison Medal of the American Institute of Electrical Engineers, highest honor in electrical engineering, it was announced yesterday.

The award goes to Mr. Dunn, who is president of Cooper Union, "for distinguished contributions in extending the science and art of elctrical engineering, in the development of great engineering works, and for inspiring leadership in the profession." The presentation ceremony was held on January 26 in connection with the annual four-day winter convention of the Institute in the Engineering Societies Building, New York City.

Minimizing Inductive Interference

(Continued from page 21)

the output of the standard noise buzzer that is used with the 1-A Noise Measuring set. In the newer visual noise measuring units zero reference noise level is established as 10^{-12} watts of 1000 cycle energy dissipated at the input terminals of the instrument. This reference noise level is equal to approximately 7 *noise units*. This is for readings taken of line noise. If the reading is taken across the telephone receiver of a subscribers telephone (common battery) reference noise would be taken as 14 units due to the filtering action of a common battery set.

● Noise readings taken with a visual instrument in terms of the db can be converted to noise units using any current ratio vs table and remembering that zero level corresponds to 7 noise units. For example 20 db (current ratio of 10.00) would correspond to 7x10=70 noise units. 350 noise units would correspond to 34 db.

NOTE—A major part of the data in this article has been gleaned from Bell System and Edison Institute sources. The telephone industry owes a great deal to the splendid work done by the Joint Committee in investigating and charting the way in this important phase of communication engineering. Credit is gratefully acknowledged to the above sources.

— B. C. B.

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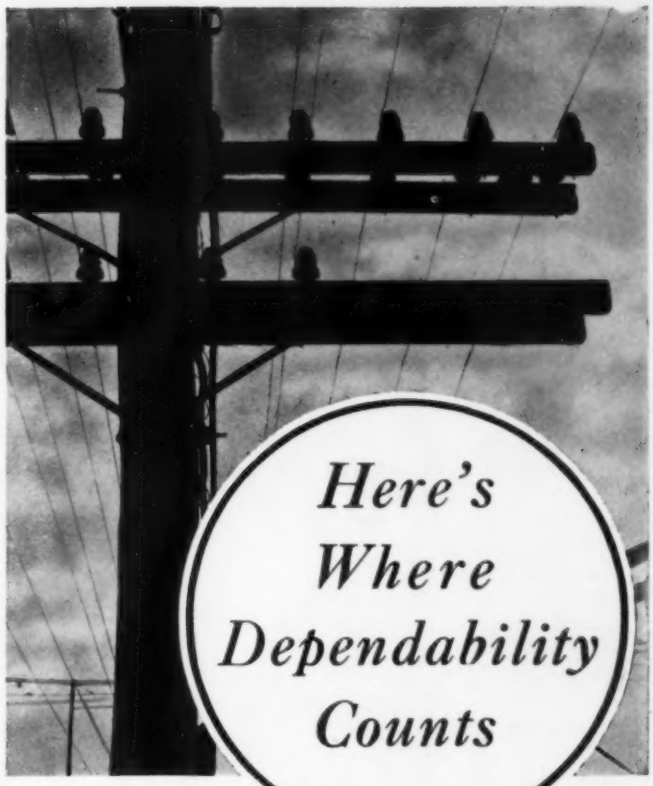

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UNITED STATES STEEL

Plant Maintenance Supervision

By M. A. JENNINGS

A COMPARISON of the methods of maintaining telephone equipment of a few years ago with the modern and more complicated apparatus of today, discloses a striking change in the maintenance practices required as a whole.

In consequence thereof, there is a growing recognition of the practical significance of selecting and training men to fullfil the requirements of supervising the necessary maintenance work in order that the new equipment may be kept up to the highest degree of operating efficiency. In this respect first line supervision is very important.

By first line supervision is meant that form of telephone plant management that has it's functions in the direct coordination, stimulation, instruction, and direction of a small force of plant maintenance men. First line supervision is successfully performed. Supervision requires consideration of a number of distinct plant maintenance details, all of which must be properly put into practice. *Many of the difficulties in plant maintenance supervision have their source in some minor details either overlooked entirely or improperly cared for, inattention on the part of someone often being the cause.*

● A summarization of plant maintenance supervision may be made as follows: The supervisor should be well equipped for the job. He should have a sense of proportion, a sense of the fitness of things, that is, know the fundamental principles set forth in supervisory practices which usually divide themselves into three distinct phases thus: (1) Analysis and planning, briefly, this means determining what is to be accomplished and setting up a program which will insure the completion of the project. (2) Training or preparing individuals to perform certain definite plant maintenance work in the proper manner. (3) Inspection or checking results.

A first law of personal efficiency of the first line supervisor is that he keep informed through trade journals, especially "TELEPHONE ENGINEER" and other forms of up to date matter appertaining to the scientific, technical, and practical movements in the telephone world about him, because keeping abreast of the times is an integral part of the life of the modern telephone plant supervisor.

A second law of personal efficiency is what is described as the "Law of Time Instinct." This is said to be simply an ability to determine how long various tasks should take, and on the basis of this knowledge, lay out each days work so that the entire program is completed. It means that if the supervisor plans the work to be performed by each member of his force as a definite task to be done within a stipulated time that has been previously plotted at the start of the work, their efficiency will be increased.

In as much as it is the duty of the supervisor to improve the work of his force through intelligent and sympathetic cooperation, it is also the duty of the workers to accept instruction and act upon them in a willing spirit.

Supervision requires that the supervisor should make the best use of the time that is at his disposal for supervising. Some workers require considerable supervision. It may be necessary to visit them often to check on all their work. Others again, need but little supervision. Some are quick to adapt suggestions to their work. A hint is often sufficient, with others, it is necessary to spend considerable time directing on the job, often requiring careful, detailed explanations, demonstrations and systematic follow-up before improvement in workmanship is obtained.

● Supervision also requires the ability to judge the real value of each workman's output and to determine correctly the nature and cause of individual weakness and to decide upon the best method to bring about improvement. Special attention should be given to those members of the force who are newly appointed. It is a mistake to leave the beginner without supervision on the assumption that he will work out his own salvation on the job. This theory has oft times proved expensive to all concerned. If, however, in spite of all the assistance and encouragement that the supervisor gives to a member of his force, and the result is still very unsatisfactory, the unpleasant duty devolves upon the supervisor to report the matter to his supervisors.

Supervisors realize that in general, there are more ways than one of accomplishing a purpose, and that methods which are successful under certain conditions or with certain individuals may not be successful under different conditions or with different personalities. Consequently, the supervisor should possess a keen sense of justice, so that no member of his force may say with truth that he has been treated unjustly either consciously or unconsciously.

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● Although justice is a fundamental characteristic of good telephone plant supervision, yet justice should be considered from the point of view of all concerned. It may be true at times that there is some value in criticism of an individual's work performance, or even that of a group. However, undue fault finding, fussiness, and insistance upon carrying out insignificant minor details are generally undesirable. Minor matters often adjust themselves and thereby render unnecessary personal conferences and criticism, with the possibility of friction and loss of time.

The handling of the force is then, as stated, undoubtedly the most important phase of all first line supervision.

Telephone Broadcast

On January 25th, C. C. Deering, Secretary of the Iowa Independent Telephone Association announced a series of broadcasts on the telephone business and rural telephone service. Opening broadcast was at 12 A.M. January 31st over station WOI at Ames, Iowa.

The second broadcast was at the same time on February 7th over the same station, at which time Secretary Deering talked about the emergency value of telephone service and how this service affects farm fire insurance rates.

One week later, on February 14th Mr. Deering discussed rural telephone problems as effected by rural electrification.

Scheduled for February 17th at 11:15 A.M. two debating teams at Iowa State College, Ames, will broadcast a debate over station WOI; the question, "Resolved that the Electric Companies, whose line caused interference with rural telephone, should pay the expense of liminating the interference." Considerable comment has been caused from the result of these early broadcasts. Information of this nature is very interesting to radio audiences, we are told, and the programs arranged by the Iowa Association will be of much value.

T. J. Cope, Inc. Announces Merger

Announcement is made of the merger of the Seeger Device Co. of Toledo, Ohio, with T. J. Cope, Inc., of Philadelphia, Pa., effective March 1. Adolph M. Seeger, former president of the Seeger Device So., becomes western manager of T. J. Cope, Inc., with offices in Toledo.

This year T. J. Cope, Inc., is celebrating its 50th anniversary in the field of underground cable installation equipment. Its position in the field is greatly strengthened with the addition of the Seeger products.

Showmanship In Business

(Continued from page 19)

The house builder who invested 90c in little red curtains found that his 90c curtains would sell a $5000 house quicker than any similar investment.

● Color is an important element of beauty. Use it to advantage whenever possible. Sales of colored telephones are increasing rapidly, and colored telephone booths are a recent innovation used in many up-to-date establishments.

Good-looking trucks are certainly a rolling advertisement and definitely stamp a company as modern and progressive. Old trucks date you unfavorably. Here is a curious sidelight. The National Safety Council tells us that good-looking trucks meet with fewer accidents than the junky-looking ones.

● Good-looking advertising plays an important part in reaching the public. People are always attracted by good-looking ads. Posters—window displays—Newspaper ads—all give you an opportunity to cash in on this thing called beauty.

One of the fundamental selling appeals of phone companies is conservation of effort. One phone company advertises that "A good beauty treatment is to avoid tiresome shopping. Save wear and tear on your nerves and your body. Shop by telephone."

Printed forms that reach the consumer are either good-looking or they are not—and if they are not—you may be sure you are losing a grand opportunity to enrich your good-will. Your letterheads, your envelopes, your statements they all represent either a plus or a minus for eye appeal. Good looks are important. Take a good look at your place right now and see whether it measures up to the quality of your service.

For the benefit of those readers who would like to hear Mr. Kaufman's famous talk on Showmanship, we include his February speaking itinerary:

February	1—Pittsburgh
	2—Chicago
	8—Chicago
	10—Columbus
	15—Milwaukee
	16—Minneapolis
	17—Cleveland
	22—Columbus
March	2—York, Pa.
	7-9—Chicago, Ill.

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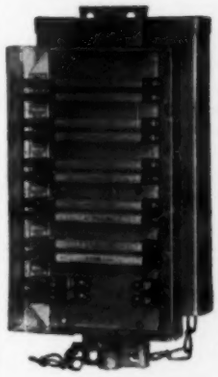
For DEPENDABLE TELEPHONE TERMINAL AND PROTECTION EQUIPMENT

Insist on COOK

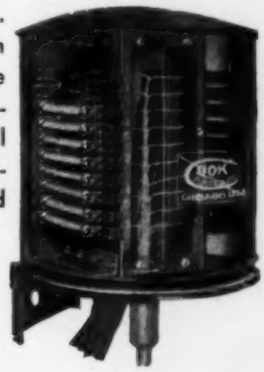


S-X TERMINAL

The Cook S-X is a 4, 5 or 6 pair terminal for spots where you require just a few subscribers' drops.

S-6 TERMINAL

Cook S-6 Terminal provides a perfect means of terminating and distributing cable—and effective protection with a minimum maintenance cost. 11 to 102 pairs. Equipped with Cook True Gap Dischargers that will not permanently ground the line.



COOK ELECTRIC CO.
2700 Southport Ave. Chicago

Always Specify COOK PROTECTION

This powerful pruner cuts closer, is stronger than any other similar tool on the market. Can be operated in close tangled growth; cutting easily and cleanly branches up to 1½" in diameter. No trouble with spring breakage.

Here is the only pruner with the famous Seymour Smith "Center Cut" construction; safety catch to lock blade closed; one piece tempered tool steel blade; reinforced hook; extra long life spring; ball bearing pulley; highest quality chain; unbreakable iron head.

Designed by experts for experts; demanded by public utility companies everywhere, it will pay you to write for literature and prices.

SEYMOUR SMITH & SON, Inc.
132 MAIN STREET
OAKVILLE, CONNECTICUT

New nut housing. Locks Anchor firmly on rod. Rod cannot slip thru Anchor when being installed.

EVERSTICK ANCHORS...

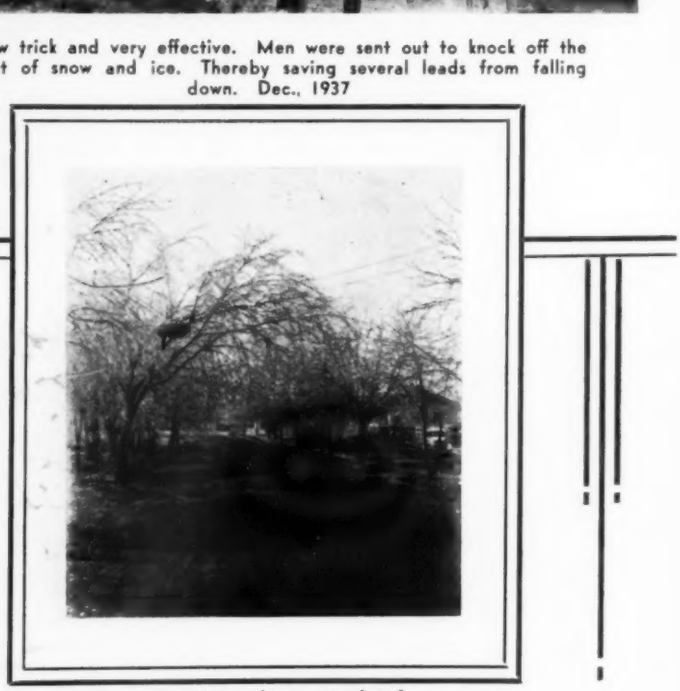
Engineers appreciate Everstick features which assure safety, long life and ease of installation in any soil condition.

A complete line with 3 types of expanding Anchors and rigid types of Cone Anchors. All sizes and holding capacities. Write for Everstick literature including new folder on Rural Electrification Lines.

THE
EVERSTICK
ANCHOR CO.
FAIRFIELD, IOWA

VISUAL STORY OF DECEMBER SLEET STORM, SULLIVAN MO.

A new trick and very effective. Men were sent out to knock off the weight of snow and ice. Thereby saving several leads from falling down. Dec., 1937



A pretty picture but not so hot for telephone men.

Superintendent Cline does his part and revels in the going

Ice and snow was 1" thick on the wires. Damage this winter is much lighter than last

MINNESOTA HOLDS 29th CONVENTION

Although weather conditions curtailed early registration of the meeting of the Minnesota Telephone Association, in Minneapolis on January 25, 26 and 27, it did not prevent them from a record-breaking attendance at the banquet and entertainment with 400 guests.

President J. P. Keane of Pine Island, Secretary-Treasurer of the Pine Island Telephone Company, was unable to attend, but was honored by being reelected, as was vice president H. F. Lueders of Norwood who ran the meeting in Mr. Keane's stead; and secretary J. C. Crowley, Jr., of St. Paul.

The five directors whose terms had expired were reelected: G. M. Dwelle, Lake City; W. A. Eckles, Blue Earth; H. F. Lueders, Norwood; Leland Wright, Alexandria and S. A. Rask, Blooming Prairie.

The meeting was the 29th annual convention and wasted little time in getting down to business after registration. Trend of the industry in Minnesota prove conclusively that sales effort is necessary in showing steady gains in stations installed. Farmer or rural lines showed very little increase because of lack of a definite sales effort. With the first three-quarters showing a handsome station gain very little increases were reported for the last quarter.

Topics receiving most attention were: rural electrification, taxes, and discussions on the minimum wage law.

J. P. KEANE, Who Was Re-Elected President of Minnesota Association

J. C. Crowley, Jr., Secretary

Adopting a resolution defining the arbitrary policy of the REA in regard to litigation was unanimously adopted by the convention. Further, copies of the resolution are to be forwarded to each of the Minnesota senators and members of congress that steps might be taken to prevent expenditure of federal funds by the REA for the purpose of attempting to set aside laws of any state or the rules and regulations of any of the state regulatory bodies.

Much praise should be given Secretary J. C. Crowley, Jr., St. Paul, who was reelected secretary-treasurer for the well balanced program and the unexcelled entertainment arranged for those attending.

A Pioneer Reports On Europe

(Continued from page 31)

of carrying a chip on the shoulder and daring anyone to knock it off. Soon some one will bob up and it will be just too bad for civilization.

All the efforts of the past to Christianize the world are being rapidly wiped out by agnostics in power. The radio has been a big factor on both sides, but greatly in favor of the rulers who in many cases deceive the people by fine platitudes and in deprecating the other

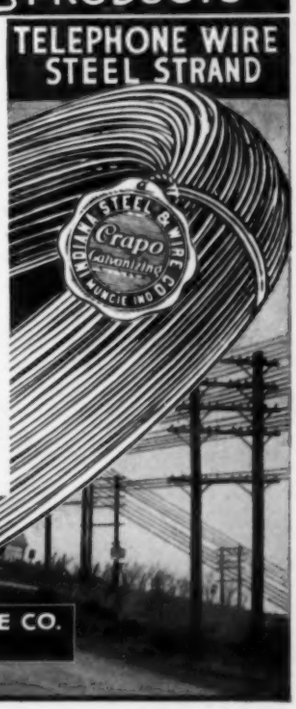
Crapo GALVANIZED PRODUCTS

LOWER MAINTENANCE COST WITH Crapo LINE WIRE!

Crapo Galvanized Telephone Wire, with its heavy, uniform pure zinc galvanizing, constantly is establishing new records for long life, low maintenance costs, all 'round dependability. Its protective coating of zinc—applied by the Crapo Patented Process—is so adherent, so tenaciously bonded to the wire, that it withstands sharp bending and twisting; provides corrosion-resisting joints; affords lasting protection against destructive elements.

The transmission qualities, tensile strength and ductility of Crapo Galvanized Telephone Wire are as dependable as its galvanizing. For, each grade and size is produced from start to finish to meet the most exacting specifications.

Crapo Galvanized Telephone Wire and Crapo Galvanized Steel Strand are readily available from representative Jobbers. Consult the nearest distributor, or write direct!



WHY KLEINS?

No. 201 N. E. Klein Side Cutting Plier. "Streamlined" for use in confined spaces.

Good workmen demand good tools. In the hands of men who know — everywhere — the pliers are invariably Kleins. Only the keen, hand-honed, perfectly matched cutting knives of Klein Pliers — only the comfortable spring grip in the Klein handles — only the general all around quality that is an inherent part of every Klein Plier can satisfy men whose work demands the best in tools. This, perhaps, explains why Klein Pliers are the standard of quality by which others are judged — why the name Klein has stood for maximum quality, "since 1857."

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons Established 1857 Chicago, Ill. U.S.A.

3200 BELMONT AVENUE

side. The rulers in power today are there because they are past masters in the art of deception. The economic difficulties of these rulers not only contributes to war talk, but the ghost of bankrupcty is always at their sides goading them on. ● The danger of a conflagration can very easily be overestimated. The great fear is the possibility of an emergency due to a mistake on the part of some nation or an accident which would easily be the spark to set off the fire works.

In the Irish Free State and Italy contributions are pouring in from people in the United States to friends and relatives and this, instead of helping to stabilize these countries, is goading them on. Then too they are all catering to the American tourist trade to bring them relief from economic pressure. Labor has not benefited from the new era in Europe; rather it has suffered. This fact might well be investigated by our Labor Unions, so that they might benefit by the mistakes of others.

(To be continued)

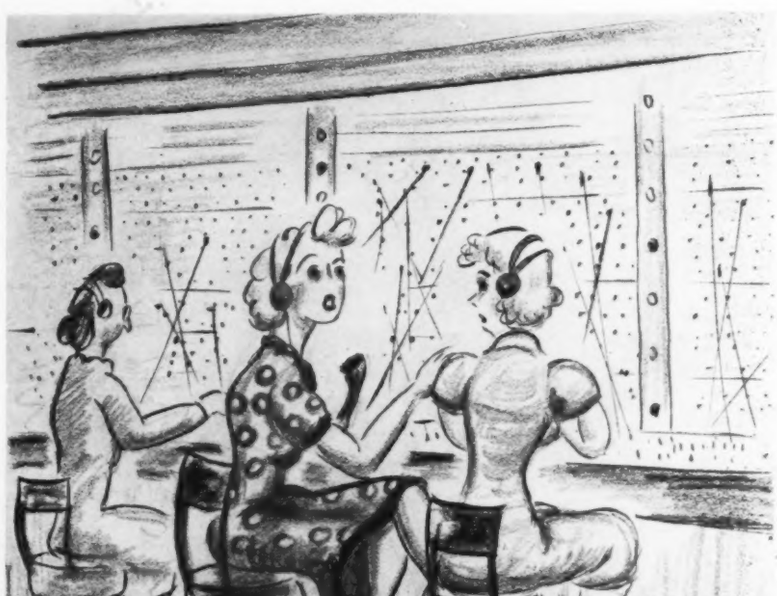
Stromberg-Carlson Appoints Donald E. Lee

The appointment of Donald E. Lee of Rochester, New York, as Sales Representative for the Stromberg-Carlson Telephone Manufacturing Company has been announced by Ben Woodbury, Telephone Sales Manager. Mr. Lee's new territory includes Pennsylvania, Virginia, New Jersey, Delaware, Maryland and District of Columbia where he will have the sale of voice-paging and sound systems as well as the company's telephone and switchboard products.

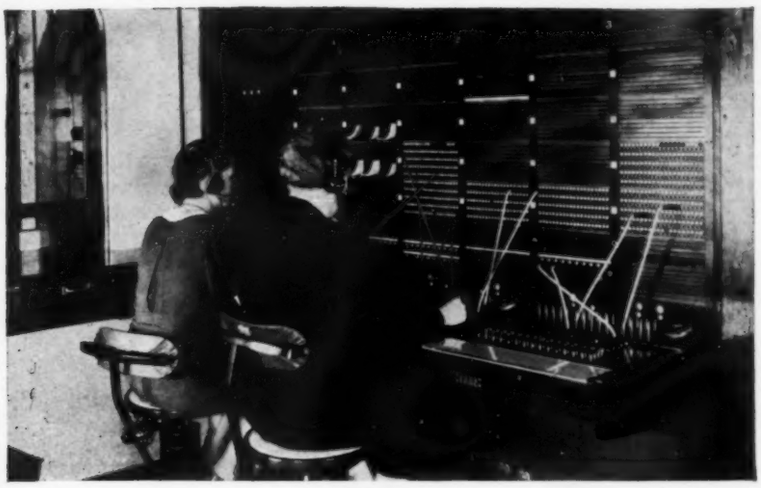
After graduating from the schools in his native town, Spencerport, New York, Mr. Lee entered the University of Rochester where he specialized in engineering and economics. He then became engaged in the electrical industry from which he gained a broad experience in shop and sales work. It was while he was with North East Electric Company—later taken over by Delco Appliance Corporation—that he took part in development work which led to the electric typewriter.

With this experience, covering a period of ten years, as a background, Mr. Lee became connected with Stromberg-Carlson Telephone Manufacturing Company in April, 1937. Within their organizations, he has had an intensive training course in shop practice, telephone manufacture and assembly, switchboard work and engineering which well fits Mr. Lee for the work that he is undertaking.

This new representative for Stromberg-Carlson is now in his assigned territory which he started to cover early in February.



"So I told him I'd walk—and he believed me!"



New Monotype Senior For Alaska Community

During recent years, the city of Anchorage Alaska has provided front page news for many U. S. newspapers as a busy center for resettlement, founding of new industries and general expansion of business in the face of the world-wide depression. That the telephone service is keeping pace in this thriving community is evidenced by the recent installation of a Monotype Senior switchboard in the new city building. The switchboard illustrated was manufactured by Automatic Electric Company, Chicago.

● From a sparsely settled tent town in 1915, Anchorage has grown to a modern city of 3000 inhabitants serving a trading area of 20,000 people. Situated on Cook inlet, an arm of the Pacific Ocean, it is the base city of all that portion of Alaska lying north of the Alaska panhandle. It is the location of the major station of the U. S. Signal Corps for that region and it enjoys exceptional transportation facilities — being the headquarters of the Alaska Railroad, a number of air lines and several steamship companies. Of late, it has become the Alaskan focal point for prospective settlers, investors, mining prospectors, big hunters and tourists.

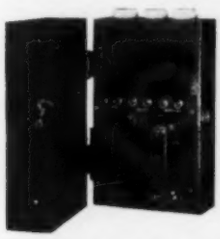
The new Anchorage switchboard is a 3-position high-keyshelf type unit with a cable turning section. It is equipped 400 common battery line circuits and 10 toll line circuits. One of the two local positions is equipped with feature type common battery cord circuits while the other has full universal cords.

● Coincident with the installation of the central office equipment, a completely new outside plant was provided. This part of the work—an all-cable project—was engineered throughout by National Construction & Engineering Company, which company also supervised the actual construction. The materials were supplied by American Automatic Electric Sales Company.

Officials in charge of the Anchorage exchange include H. E. Brown, Mayor; Frank O. Berry, Supt. of Utilities; and R. S. Bragaw, City Clerk.

Time Service In England

According to a statement by the Post Office Controller the London "speaking clock" service has produced approximately £85,000 ($425,000) additional net revenue since its inception last year. About 20,000,000 time-service calls have been made to date.



The New A-C SUPER-SENSITIVE J-C

RECTIFIER TYPE SIGNAL RELAY

● Operating current 200 micro-amp (.0002 amp) at any frequency up to 15,000 cycles — RUGGEDLY BUILT—EASILY ADJUSTED. It solves the telephone signaling problem. Write for descriptive bulletin.

JESTER-COOPER COMPANY

P O B[illegible] Ha[illegible] L

— UNCLE SAM'S GIFT TO THE NATION —

THE EVER-POPULAR

HOT SPRINGS

NATIONAL PARK · ARKANSAS

Bathe in these Famous Thermal Waters

OWNED AND SUPERVISED BY THE UNITED STATES GOVERNMENT

Bathe your way to health in the mineral waters of this famous government-supervised spa. Through a treatment of baths and through drinking the mineral waters thousands have found relief from rheumatism, arthritis, neuritis, gout, diabetes and other diseases. Nervous disorders disappear in the vigorous outdoor life of Hot Springs, that features golf, horseback riding and hiking.

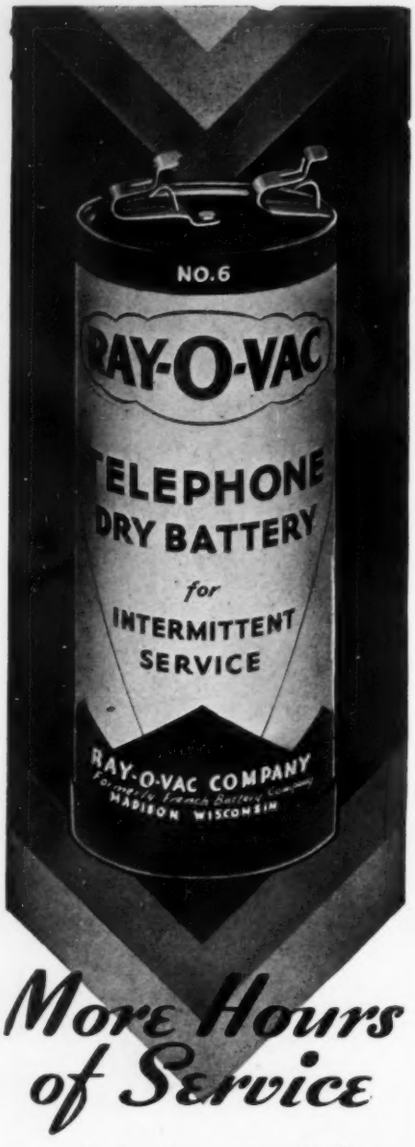
Come and Play ~ Regain Health

Stop at MAJESTIC HOTEL

BATH HOUSE AND APARTMENTS

The Majestic offers a wide choice of accommodations from single rooms, with or without bath, to beautifully furnished 2, 3, and 4 room apartments, assuring maximum comfort amid attractive surroundings. Rates are surprisingly moderate from $2.00. Two restaurants serve excellent food.

H. GRADY MANNING, Pres.
Southwest Hotels Inc.
R. E. McEACHIN
Manager



More Hours of Service

. . . that's what every telephone engineer seeks . . . *more hours of service* . . . which means fewer replacements, lower service costs! And that's exactly what Ray-O-Vac telephone batteries offer!

For 3 decades Ray-O-Vac batteries have met and exceeded specifications and requirements on every recognized telephone and light intermittent test, and surpass all government standards. For lower service costs, specify Ray-O-Vac!

RAY-O-VAC COMPANY
Formerly FRENCH BATTERY COMPANY
MAIN OFFICES AND PLANT
MADISON, WISCONSIN
Additional Factories at
Clinton, Massachusetts and Kansas City, Ohio

South Bend Announces 9-Inch Workshop Precision Lathe

The new South Bend 9-inch Workshop Precision Lathe for 1938 is announced by the South Bend Lathe Works, South Bend, Indiana. The new 1938 model has many important new features, and is offered in seven different types to fit a variety of installations.

The different types of the 9-inch Workshop Lathe are: (1) The new 12 speed lathe; (2) The adjustable Horizontal Motor Driven Bench Lathe; (3) The Underneath Belt Motor Driven Bench Lathe; (4) The Pedestal Adjustable Motor Driven Floor Leg Lathe; (5) The Double Friction Countershaft Driven Lathe; (6) The 9" - 11" Swing Raising Block Lathe; and (7) The Tool Room Lathe with draw-in collet chuck, graduated taper attachment, thread dial indicator, micrometer carriage stop, and chip pan.

The company is issuing a new Catalog No. 46, illustrating, describing, and pricing the new 1938 model 9-inch South Bend Workshop Lathe, and giving valuable instruction on performing all types of lathe work. Any reader interested in securing a free copy may write editor of TELEPHONE ENGINEER.

Stromberg-Carlson 2-6 System Cuts Insurance Office Expense

Four years use of the first Stromberg-Carlson 2-6 Telephone System ever to be installed brought praise for its economy, efficiency, and serviceability from Albert T. Churchill, Manager of the Rochester office of the Phoenix Mutual Life Insurance Company, which was equipped with the system in 1934.

The Stromberg-Carlson 2-6 Telephone System is a simplified common talking, selective ringing telephone system with six lines and two trunks providing local inter-communication and central office service from the same telephone without the services of an attendant operator. Each telephone is equipped with eight non-

Interior View of Rochester Office of Phoenix Mutual Life Insurance Company showing Stromberg-Carlson 2-6 Telephone

locking push buttons for ringing selectively any local telephone and for answering, holding, transferring or originating central office calls. Central office calls can be originated, answered, held and transferred to any station.

"We have found this system," Mr. Churchill said, "ideally suited to this office's requirements. It is much more satisfactory than the switchboard it replaced, for it does not require the exclusive attention of an operator, yet it gives us the necessary inter-communicating service with local and long distance lines available at each telephone.

"Actually our telephone bills are higher since this system has been installed, but I do not object to this as we now enjoy more and better service. On the other hand, when I take into consideration the saving of the girl's time who used to handle the switchboard, the service is cheaper.

"In the four years we have used our Stromberg-Carlson 2-6 System," Mr. Churchill concluded, "We have had to call the telephone company's service department only two times, and then only for minor adjustments."

A list dated January 1, 1938, listing prices for items shown in their Catalogue 37ME has just been issued by the Stromberg-Carlson Telephone Mfg. Co., of Rochester, N. Y. All items in Catalogue 37ME are for magneto systems,—switchboards, telephones, accessories and supplies.

Idaho and Iowa Buy Leich Switchboards

The Miller Telephone Service, Fairfield, Idaho, have just installed a new Leich magneto switchboard wired for 100 lines equipped with 60 wired for 12 cord circuits and equipped with 10. This installation was handled completely by the Leich Sales Corporation.

The improved service as a result of the new equipment has proven very satisfactory to all subscribers, and Mr. F. C. Miller, owner and manager, has reported deep satisfaction in the new switchboard to the Leich company.

Another installation of a Leich magneto switchboard has been reported by the Deep River Mutual Telephone Company, Deep River, Iowa. It was purchased recently and is wired and equipped with 100 lines and 15 cord circuits. Mrs. Grace C. Phillips is the general manager and also reports much satisfaction and a vastly superior telephone service since the installation of the new equipment.

Editorial

(Continued from page 15)

The commission however, admitted there was a diversity of opinion among engineers as to the effectiveness of the devised specifications and stated it retained jurisdiction "to make such further orders, rules and regulations in the premises as may be necessary to remove undue interference to the wires and service, properly constructed on the highway."

As stated by the commission, there is a question as to whether or not the second order did not destroy the effectiveness of the first order and whether or not the revision in the REA specifications will prevent inductive interference on ground telephone lines.

Some engineers hold that inductive interference from a power line constructed in accordance with the amended specifications will have the same, if not greater, effect on grounded telephone lines as any grounded power line, notwithstanding the fact there would be no ground within the parallel or even within 200 feet on either side of the parallel. The engineers explain that although the ground is not within the parallel, it nevertheless puts a fault on the power line beyond instead of within the parallel and there might as well be a ground within the parallel as far as the causing of inductive interference on grounded telephone lines is concerned.

In view of this opinion, it would seem telephone companies serving rural areas in Kansas can expect little protection from inductive interference on their grounded lines if the commission's second order is to be followed as a precedent. The commission certainly should follow this case closely and if inductive interference on telephone lines results from this type of construction, then it should use its prerogative "to make such further orders, rules and regulations . . . to remove undue interference to wires and service properly constructed on the highway."

Commissions prescribing reasonable rules and regulations governing construction of power lines which parallel grounded telephone lines not only maintain their jurisdiction, but they recognize their responsibility to protect the property rights if scores of small Independent and farmer-owned telephone companies in their respective states, many of which would have to close their doors and go out of business if they were forced to pay the entire cost of metallizing their grounded lines.

In protecting these small companies these commissions assure thousands of telephone subscribers in small urban and rural communities, their constit-

WHITNEY BLAKE TELEPHONE WIRE

Specialists for 40 years in the manufacture of telephone wire . . . the Whitney Blake Company has consistently offered telephone wires embodying the latest developments. All "WB" wires are outstanding for their "LONG LIFE."

Illustrated is No. 20 Twisted Pair Cellulose Acetate Distributing Frame Wire.

THE WHITNEY BLAKE COMPANY
NEW HAVEN, CONNECTICUT

WB

Distributed and guaranteed by
GraybaR
ELECTRIC COMPANY

Foreign Distributors: International Standard Electric Corporation, 67 Broad Street, New York City.

Sole Selling Agents in U.S.A.

The Clearing House

For the convenience of readers of Telephone Engineer

Accounting Systems

Bowdle Accounting System

A complete Accounting Service For Telephone Companies.

Box 642

WHEATON, ILLINOIS

Engineer-Construction

R. S. SHELY

CONSTRUCTION ENGINEER

LIGHT-POWER-TELEPHONE LINES

SWITCHBOARDS AND CABLES INSTALLED

20 YEARS ACTIVE EXPERIENCE

330 Dudley Road Lexington, Ky.

Situation Wanted

POSITION WANTED. 14 years experience as Installer of Telephone and Telegraph Switch boards, P. B. X. Boards. Repeaters, Generator Sets, Battery Plants, Multiple Carriers, Willing to go anywhere—36 years old. J. Niehaus, 811 Woodlawn Ave. Kirkwood, Mo.

POSITION WANTED—By all around telephone man. Experience 21 years, as inspector, installed, repairman, wire chief, etc. Write Percy D. Edson, 14 Clinton St., Amsterdam, N. Y.

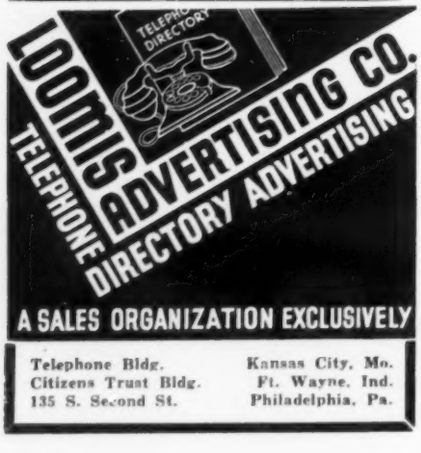
Repeaters

A New Telephone Repeater

Self-adjusting to changing impedance. No balancing nets. Adapted to Line, Terminal and Cord-circuit uses. Accurate balance; high gain.

Harding Telephone Repeaters

2138 N. New Jersey Street
Indianapolis, Ind.



Telephone Bldg. Kansas City, Mo.
Citizens Trust Bldg. Ft. Wayne, Ind.
135 S. Second St. Philadelphia, Pa.

uents, that their telephone service, which they have used and depended upon for so many years, will not be discontinued or interrupted.

The small telephone companies serving rural areas appreciate the effort being made to protect their rights, properties and facilities so they may continue to serve their subscribers as efficiently as in the past.

USSR Extending Telephoto Service

The Communications Commissariat is proceeding with plans to extend telephoto service to include the principal industrial centers of the country. At present the service is available between ten of the main cities all connections being made via Moscow, but the Commissariat will extend the terminal facilities so as to eventually provide direct inter-city communication.

For rate purposes, the Soviet Union is divided into two zones: zone one includes the area within 2,000 kilometers of Moscow; zone two is the area beyond that distance. The charges will depend upon the size of the original as well as class of service, of which there are three-ordinary urgent and "lightning." The charges for urgent and "lightning" messages are respectively, three and six times those for ordinary service.

Gould Issues Stationary Bulletin

The Gould Storage Battery Corporation of Depew, New York, have issued their new stationary bulletin No. 138, which is available to all readers of this publication. The new catalog provides information on storage batteries which we believe will be of extreme interest to our readers. Copies may be requested from TELEPHONE ENGINEER or by writing the company direct. For further reference see page 6 of this issue.

Salesman Wanted

"SALES POSITION OPEN"—For experienced telephone man, selling supplies and service to Independent telephone companies in Wisconsin and Minnesota. Age between 25 and 40. Wide acquaintance in field valuable. Salary. Good proposition. Give details of experience in first letter. Address Box 1014, Telephone Engineer.

Poles

Carney

CEDAR POLES

Plain or Butt Treated

B. J. CARNEY & CO.

100 No. 7th St. Minneapolis

VC

Finished Cedar Poles

VALENTINE CLARK CORPORATION

St. Paul, Minn.

Telephone Directories

Telephone Directory

ADVERTISING

Write or telephone for proposition

L.M.BERRY & CO.

Call L.D.16-Telephone Bldg., Dayton, O.

Telephone Engineers

J. G. WRAY & CO.

Telephone Engineers

Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization and Operation of Telephone Companies

105 West Adams Street
CHICAGO

J. W. WOPAT

CONSULTING ENGINEER

Telephone Engineering — Construction Supervision — Appraisals — Financial — Rate Investigations

303 East Berry Street
Fort Wayne, Indiana

JOHN C. LARKIN AND COMPANY

● CONSULTING

ACCOUNTANTS AND ENGINEERS

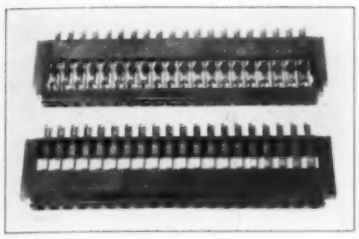
Specializing in a Professional Service to Telephone Utilities Covering the Field of Accounting and Engineering

Chamber of Commerce Building
SYRACUSE, NEW YORK

The Clearing House

For the convenience of readers of Telephone Engineer

RECONDITIONED JACKS-LAMP



5 - 10 - 20 per strip

Write for circulars.

Buckeye Telephone & Supply Company

COLUMBUS, OHIO

RECONSTRUCTED EQUIPMENT

Genuine Western Elec. No. 1317 Pony type 3-bar 1000-1600 or 2500 ohm ringer compact wall telephones with short arm and slope Shelf. @ $9.25—5-bar $11.75

Genuine Western Elec. No. 20AL desk set with No. 315 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set @ 10.00

Western Elec. No. 20AL. desk set with Transmitter, Rec. & Cord less signal set @ 5.50

Kellog No. 118 desk set with Trans. & Rec. Complete with 3-bar 1000-1600 or 2500 ohm ringer external post connection set @ $8.50—5-bar @ 10.75

Kellogg No. 2808 Pony type 3-bar 1000-1600 or 2500 ohm ringer compacts with short arm @ $9.00—4-bar @ 10.50

Kellogg No. 2696 type 4-bar 1000-1600 or 2500 ohm ringer compacts with short arm @ 8.00

Kellogg No. 84 unbreakable desk set with No. 2328 3-bar 1000-1600 or 2500 ohm ringer insise connection signal set @ 10.00

Stromberg Carlson No. 896 Pony type 3-bar 1000-1600 or 2500 ohm ringer compacts with short arm and slope shelf @ 8.75

Stromberg Carlson No. 988 desk set with 3-bar 1000-1600 or 2500 ohm ringer external post connection signal set$8.75—4-bar @ 9.50

Monarch No. 33 desk set with 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set @ 7.85

Dean Elec. Co. desk set with 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set @ 8.25

Western Elec. No. 20 desk set with Dean or Monarch Trans. complete with external post 3-bar 1000-1600 or 2500 ohm ringer signal set @ $7.75—4-bar $8.50—5-bar @ 10.00

Western Elec. No. 122 Receivers with posts less cord @ ..... .65

Write for Bulletin

REBUILT ELECTRIC EQUIPMENT CO.

1934 West 21st St., Pilsen Sta.
Chicago, Ill.

News Flash From Washington

Legislation for the protection of rural telephone service from impairment due to rural power lines construction was proposed in two bill introduced Tuesday by Senator Morris Sheppard of Texas. One bill includes rural telephone companies in the category of firms which may borrow from the Reconstruction Finance Corporation and the other measure requires the borrower of REA to spend as much of the loan as necessary to protect telephone service from injury.

Senator Sheppard said his bill for reference loans was approved by the Rural Electrification Administration but that it opposed the other measure requiring expenditure of REA loan money to protect rural phone service. The latter bill, Senator Sheppard said, he introduced following correspondence with Oscar Burton of Tyler, president of the Texas Telephone Association. Mr Burton told the senator, Texas was one of the states with a considerable number of independent rural telephone companies.

REA has experienced delay in some of its projects in the past due to complaints of telephone companies that pole line construction interferred with its phone service. Senator Sheppard explained he proposed two alternatives as a solution of the difficulty. He emphasized he was taking no position in the controversy between the REA and rural telephone companies.

The proposed amendment to the REA Act reads as follows: "Provided, further, that all plants lines, systems and facilities, the construction and operation of which shall be financed in pursuance of this Act, shall be so constructed and operated as not to impair the established telephone service being rendered to persons in rural areas at the time of such construction, and the administrator is hereby directed at the time of making any such loans to impose upon the borrower such conditions and to require the borrower to make such expenditures from the money so borrowed as may be necessary to protect such telephone service against any impairment by reason of such construction or operation."

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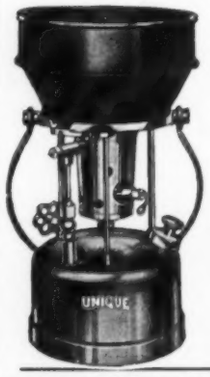

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